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OUTLINES

OF

THE VETERINARY ART.

OUTLINES

OF THE

VETERINARY ART;

OR,

A TREATISE

ON

THE ANATOMY, PHYSIOLOGY, AND CURATIVE TREATMENT

OF THE

DISEASES OF THE HORSE,

AND, SUBORDINATELY, OF THOSE OF

NEAT CATTLE AND SHEEP.

ILLUSTRATED BY SURGICAL AND ANATOMICAL PLATES.

BY

DELABERE BLAINE.

THE FIFTH EDITION,

REVISED THROUGHOUT; AND CONSIDERABLY IMPROVED AND ENLARGED BY THE
INTRODUCTION OF MANY NEW AND IMPORTANT SUBJECTS, BOTH IN THE
FOREIGN AND BRITISH PRACTICE OF THE ART.

LONDON:
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PREFACE.

IN this fifth edition of the VETERINARY OUTLINES, I have endeavoured to embody within its pages the various improvements in the art which have taken place between the past and the present, to render each more worthy of patronage and support than the other. Hitherto my encouragement has been considerably greater than I had anticipated. It has indeed become a text book, and been translated into most European languages. Nor has it been less favourably received at home also, as the number of large editions it has passed through testify. I have now only to regret, that the state of the art, at its commencement, rendered the first editions less worthy of the public, and of myself, than I could have wished. Such, however, as it then was, its reception was gratifying, and marked with many approbatory notices; from among which the following may be selected:—

'Mr. B—— had previously published the Anatomy of the Horse, re-pub'lished in this Work, in which he professes the parts treated of have been 'most of them taken from his own dissections. So far he has a fair claim 'of originality.'—'The drawings appear extremely correct; are executed in 'the most handsome manner; and the descriptive part is equally entitled to 'praise.'—*London Medical Review.*

The *Medical and Chirurgical Review,* after a full and favourable analysis of the Work, continues:—'The classification adopted by the author 'will materially assist the student in this branch of medicine, who is too apt 'to be misled by the barbarous and unmeaning jargon adopted, in general, 'in books of farriery.'

'Mr. BLAINE, we believe, is the first who has attempted, in the English 'language, a systematic view of the whole, founded upon scientific principles, 'in conformity with the modern discoveries in anatomy and physiology; and 'with the modern theories, concerning the nature and causes of the different 'morbid changes which the living frame undergoes.'—'In treating of each 'disease, he gives a clear and accurate description of its symptoms; points 'out its causes, states the degree of danger, and usual modes of termination; 'and subjoins a simple, rational, and scientific plan of cure. What a pleas-

'ing contrast this forms to the miserable productions entitled "Stable Directories," "Complete Farriery," &c., every page of which is crammed with 'farragoes, called recipes; certainly not inert, but often possessing a potency 'of the most dangerous sort!'—'It appears to us that this Work is the best 'and most scientific system of the veterinary art that has hitherto appeared 'in this country; and we therefore recommend it to all who are desirous of 'acquiring a competent knowledge of the structure and diseases of the horse, 'and other domestic quadrupeds.'—*British Critic.*

The *Moniteur* of the 25th July, 1804, contained a very copious review of this Work by M. Peuchet, the celebrated French Veterinary Professor, which ended with the following summary:—'Nous pensons à la maniere 'claire et simple dont l'auteur a traité chaque objet, qu'il a rempli son but; 'que cet ouvrage a le double mérite d'être à la portée de tous de tous les 'genres de lectures; que les personnes dont la profession est de faire la 'médicine des animaux se priveraient d'un grand secours en négligeant 'de le consulter, et qu'il peut très utilement servir a ceux qui se livrent a la 'plus importante branche de l'économie rurale, celle de l'education des 'bestiaux.'

This Fifth Edition of the VETERINARY OUTLINES is offered with a hope that it will be found to contain numerous and important additions. As extended experience has brought us into acquaintance with many new diseases, I have found it necessary to enlarge the nosological list, and consequently the curative treatment of them also. Many improvements have likewise been made in veterinary surgery, which have been noted. To introduce the whole of these, it has been found necessary still further to abbreviate the less important parts of the anatomical detail. The essential and more useful subjects have been retained, and often enlarged on; so that I feel confident the student will hail the alteration, and gain by the substitution. The whole has been carefully revised, and its matter has received that correction throughout which the experience of others and my own investigations have pointed out as necessary on the various subjects of the Work.

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INTRODUCTION.

IF the animals domesticated by man be essentially necessary to his comfort and convenience, no apology need be offered for attempting to reduce into a system the arts of preserving them in health and of removing their diseases; both of which must be founded on an intimate acquaintance with the structure, functions, and economy of the bodies of these animals: and which acquirements, therefore, form the groundwork of what is called the *Veterinary Art.*

The deplorable state of this art in Great Britain has, until lately, been animadverted upon by every one who has written on the subject; the principal cause of which appears to have been its total abandonment among persons of proverbial ignorance. The value of the animals in question, and particularly that of the horse, is a theme that has exercised, in every age, the pen of thousands; yet the knowledge of the means of preserving him in health has long been consigned to the groom, as that of treating his diseases devolved on the maker of his shoes. The whole study was regarded as beneath the dignity of a man of education, and the practice as derogatory to the character of a gentleman.

But, at length, mankind becoming wiser were disposed to receive this among the liberal arts, and to regard the profession and practice of it as no longer incompatible with the pretensions of the scholar or the rank of a gentleman. The establishment of a Veterinary College has tended much to this; and the subsequent benefits derived from the excellent practitioners who have emanated from it, have still further added to the dignity and acknowledged importance of the art. There are, however, persons desirous to obtain information on the subject who cannot apply to this source; and there also are others, who, having had its advantages, still wish a condensed form to revive in their memories the fleeting images of former instruction. Among the first are such farriers as are sensible of their own defects, and anxious to repair them, but who cannot leave their homes: for these, the former writings have few of them been direction-posts to much improvement, by teaching its principles, but have centered their benefits in their recipes.

Too many of the class called *farriers,* however, even yet are not willing to be put to the trouble of learning, nor to the mortification of owning that they need it; hence they obstinately maintain, that nothing is necessary but what is already known; and that theirs is purely a mechanical art, learned by imitation, and that it even descends in perpetuity from father to son. We find one of their body boldly combatting against improvement in the following terms:—'Whatever may be written by those new-fangled farriers of the advantages resulting from a minute knowledge of anatomy, nothing in their practice has proved its utility.' Fortunately, however, for the horse and his owners, the well-informed part of mankind now think very differently; and are fully aware that to the study of anatomy and physiology we are indebted for our present knowledge of his diseases, and our improved methods of treating them. By our dissections of morbid subjects many very important errors have been detected. We now are aware that the grangrenous state of the lungs, which the older farriers attributed to chronic disease, is the simple effect of active inflammation: and, instead of a stimulating treatment by cordials as formerly, which almost invariably proved fatal, we bleed, blister, and nauseate; and, if timely called in, we usually save our patient in a disease which heretofore destroyed three-fourths of those it attacked. The different diseases of the bowels, notwithstanding their anomalous symptoms, are likewise illustrated by morbid anatomy; and we have thereby been enabled to make the important distinction between inflammatory and flatulent colic, and to treat the case according to the distinctions made between them. It is from the same sources, that we have been taught also that many colics are the effect of strangulation, intussusception, and hernial displacements of these organs; diseases hardly thought of before. From these, likewise, we now know the disease called *molten grease* to be no *mechanical melting of the animal fat*, but a dysenteric attack on the mucous surface of the large intestines.

To what but anatomy and physiology do we owe our present acquaintance with the diseases of the feet? And if the services we require of the animal are such as to prevent our conquering the whole of them, we yet have greatly mitigated his sufferings. In the first place, we now avoid torturing the shoulders (as heretofore), as the seat of almost all the lamenesses which occurred; and, secondly, we are now enabled to relieve him from pain consequent to foot affections by neurotomy. To an acquaintance with the anatomy of the eye it is that we no longer attribute *ophthalmia* to an enlargement of the *haw*: it has also prevented us from cruelly depriving the horse of a necessary organ, as a mistaken cure for the disease. Have anatomy and physiology, therefore, taught us nothing?

The subject-matter of the VETERINARY OUTLINES I have divided into *Four Parts*. The *first* of these comprises what may be termed the collateral branches of the art, as the natural history of the horse—A general view of veterinary medicine from its origin to the present time—A short detail of the proper means to be pursued for the attainment of the art—A minute examination of the exterior conformation of the horse—A philosophical and mechanical inquiry into the operations of progression—A treatise on condition; and, lastly, we have glanced at the principles and practice of stable management, with its components, dieting, grooming, and exercise.

The *second* division of the Work is occupied by an anatomical description of the several parts of the body, blended throughout with a physiological account of the functions and economy of the parts, and of the morbid states into which they are liable to fall. As an intimate acquaintance with the structure of the extremities is most essential to the veterinarian, they are described separately, that the practical remarks on them might come into one point of view. The anatomical part of the Work has been illustrated by plates, as I deem them of the greatest possible assistance to the learner, particularly where he cannot have recourse to the subject itself; and, as the original drawings were all made by myself from my own dissections, I may venture to answer for their correctness. In the parts represented, I have endeavoured to form such an arrangement as would prove most important, either in elucidating the economy of the animal, or, as more immediately concerned in the practice of the art, might be particularly brought forward and represented: and throughout the whole detail it has been less my study to dress its pages in classic attire, than to make it plain and intelligible to all.

The *third* division of the Work is allotted wholly to the practical part of the veterinary art, or to a description of the diseases of the *horse*, *ox*, *sheep*, and *dog*, and the curative treatment of them. Fully aware of the value of a systematic grouping of the diseases of the horse and other domestic animals, I have attempted a slight, and only a slight, arrangement of them; for as some remote parts of the body follow the same laws in structure and economy, so they are liable to the same diseased affections. The inflammation of mucous membranes produces similar appearances in many respects, whatever part of the body it takes place in. The inflammation of the cellular membrane, productive of phlegmon and abscess, is alike, whether it occurs on the cheek or on the buttock; hence a knowledge of these diseased affections can be rendered more comprehensive by their being classed under one head, than when scattered, as they have hitherto been, over the different parts affected. This classification forms twenty heads or classes; ten of which include the medical part of the art, and ten belong to the surgical; after which, the operations that occur in farriery are severally treated on. It is with pleasure we are able to announce the aids now added to our practice of medicine from a most excellent *Manual of Veterinary Pharmacy*, by Mr. Morton, lecturer on that subject. This addition cannot fail to assist in systematizing our formulæ of agents to be used in the curative treatment of the ailments of our domestic animals.

The *fourth* division is dedicated to the Veterinary Materia Medica, or the chemical and pharmaceutical nature of drugs; with the forms and doses in which they are administered: and, with such important aids as are offered to our notice in this Manual, we hope to present much instructive matter to the veterinary student. To the whole is added a copious Index, by which means subjects otherwise disjointed may be drawn together into one point of view; and by the introduction of a copious synonyma, the reader will be readily enabled to find any subject he wishes under any term that is familiar to him.

OUTLINES

OF

THE VETERINARY ART.

SECT. I.

HISTORY OF VETERINARY MEDICINE.

MAN, ever ready to improve surrounding objects to his advantage, would not be long without subjecting to his use such animals as his reason led him to suppose would prove most useful, or his experience had proved were the most tractable. It would appear that the Ass was first subjugated to the use of man; nor was it until, as we learn from Genesis, chap. xlvii, that, with the herds of asses, Horses also were sent to Pharaoh, which Sir Isaac Newton computes to have been 1034 years before Christ, about which time also the renowned Erictheusa ppears to have been employed in taming and breaking the horse to the use of man. But animals, when domesticated and removed from a state of nature, could not long continue in perfect health; and hence their owners were led to search for such remedies as their small stock of information pointed out: thus veterinary medicine must, in some degree, have been coeval with the domestication of the animals in question. The early practice of it was, however, without doubt, mingled with their general management, and what little was known existed in common among those professing the arts of rural economy. When the early Egyptians had trained the horse to the purposes of war, his health may be supposed to have become an object of much solicitude; and his diseases were probably either attended to by select individuals, or were otherwise pursued by the professors of human medicine of those days. From the Egyptians the Grecians received the knowledge of the management of the horse; and with them we know it flourished. Chiron, surnamed the Centaur, pursued both human and brute medicine. Homer, who flourished nine hundred years before Christ, celebrates the training of the horse in the Greek courses; and Xenophon, their most renowned warrior, poet, and philosopher, wrote a treatise on equitation *(De Re Equestri)*, which contains ample proof how much the study of the treatment of this valuable animal was in repute among the most distinguished characters of his day. Hippocrates, also, the most celebrated physician of early times, wrote a treatise on the curative treatment of horses; nor did he disdain, in common with the eminent human practitioners of those times, to practise indiscriminately on the horse and his rider. 'On peut aussi remarquer que ces deux médecines des hommes & des brutes, étoient autrefois exercées par une même personne; Apsyrtus nomme souvent un médecin de chevaux, & quelquefois simplement un médecin. Ansi, au commencement du 1 livre, il y a pour inscription, Apsyrtus à Hippocrates, médecin de chevaux, salut; & au chap. 22, Apsyrtus à secundus, médecin de chevaux salut; au chap. 42, Apsyrtus à Statilius Stephanus, médecin salut; & au chap. 69, Apsyrtus à Hegesugoras, très bon médecin, salut. Tous ces hommes là, pratiquant la médecine sur les chevaux, consultoient Apsyrtus touchant leurs maladies les plus importantes.'—*Dict. d'Hippiatrique*, tom. ii, p. 411.

When Rome had snatched from Greece her honours and her arts, the horse became an object of attention; and a host of Latin authors on subjects connected with him sprung up, whose very names would swell our pages. As a rustic writer, Columella deserves our mention; the rest we pass over to the time of Vegetius, the veterinary Hippocrates, who flourished about 300 years after the birth of Christ, and whose writings concentrated within themselves all that had been collected by former veterinary authors of the commonwealth. A long night of darkness succeeded the irruptions of the barbarous nations, and formed a melancholy break in the page of civilized man. During this time, however, iron shoes, before but partially tried, became more generally used; and by an association only to be excused by the state of the times, the treatment of the diseases of the horse became the province of the maker of his shoes; and the medical assistance required for other beasts was gained from goatherds, shepherds, &c.

The ancient and honourable name of *Veterinarius* (whence *veterinarian*[*]), sanctioned by the classics of the Augustan age, became lost in the more humble appellative of *farrier*, derived solely from the metal on which he worked; and for a long period (happily now on the decline) the ignorance of the shoer and the meanness of his title remained indissoluble[†].

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[*] Mr. Bracy Clark appears to consider the Latin word *veterinarius* as one of 'doubtful etymology' (*Farrier and Naturalist*, No. 1); and it is certain that it has been the subject of much discussion: nevertheless, we think that the known taste and learning of the great Roman authorities by which it was used, are sufficient vouchers for the critical propriety of its adoption. The French, from whom we borrowed it, appear to have been always satisfied with its general correctness; but they were somewhat divided about the extent of its application. The more precise use *Veterinaire* for the science of animal medicine in general, and *Hippiatre* for that which treats of horses only: '*Hippiatre, médécin du cheval; d'ippos, cheval, iatros, médécin.*' Dict. d'Hippiatrique.—The curious on this subject may consult with advantage M. Huzard's *Notice sur les mots Hippiatre, Veterinaire, et Marechal.*—Hurtrel d'Arboval attempts to illuminate us on the same by the following:—'*Hippiatrique.* Médecine du cheval. Les Grecs comprenaient implicitement, dans les mot *iatrique*, la médecine générale, et dans celui d'iatre, le médecin. Ansi la médecine des animaux n'avait pas de nom particulier chez eux. Il est présumable que celle des chevaux fut pratiquée par cette nation beaucoup plus que celle des autres animaux à l'usage de l'homme, et qu'elle fut la seule qui eut le nom spécial *d'hippiatrique;* de là le nom *d'hippiatre*, donné à celui qui exerçait l'hippiatrique. De nos jours nous avons vu, pendant tres long-temps, la medécine du cheval constituer à elle seule toute la médécine vétérinaire.'—'Vétérinaire le nom dérive de *veterina*, dont a faire *vétérinaria* et *veterinarius*, termes que les Romains employaient souvent, le premier à designer la médecine des bêtes de somme; le second celui qui la pratiquait; quelquefois ces deux expressions étaient accompagnées des epithètes *medicina* et *medicus.*—Depuis les temps modernes, le mot *vétérinaire* est généralement admis en France et dans une grande partie de l'Europe; il est des deux genres et a une double acceptation; il signifie egalement la médecine et le médecin des animaux. Comme, en Français, c'est l'article qui indique le genre, on doit dire la *vétérinaire* pour le médécine des animaux, et le *vétérinaire* pour le médecin des animaux. On prend aussi le mot de *vétérinaire* adjectivement, comme plusieurs autres termes de notre langue, et l'on dit indistinctement la médécine ou l'art vétérinaire.'

[†] *Maréchal, Maréchallerie.* On appelle *maréchal* l'artisan qui forge les fers pour les pieds des chevaux, et qui ferre ces animaux. Le môt maréchal, dont nous avons fait *maréchallerie*, derive de *marescalus*, qui n'est point Latin, mais Celte ou Gaulois Latinisé; il dérive du mot Celtique marc'h, mark ou marh (cheval), et celui de schalk, qui signifie serviteur.—*Dict. Méd. et Chirurg. Vétérinaires.*

The sixteenth century, famed for the revival of learning and its encouragement of the arts, fostered also the subject of our present discourse: among its patrons may be noted Francis the First, who ordered the Constantine collection to be translated from the original Greek into Latin; from which it was soon afterwards rendered into Italian, German, and French, and thence became dispersed over Europe. About the same time, the works of Vegetius were translated into the popular European languages; and from this period we may date the gradual improvement of the art, evinced by the numerous writers who followed.

During the seventeenth century, the veterinary art continued to advance, and numerous publications on the subject were elicited from various hands; among which we may notice Cæsar Fiarchi's Italian treatise on horsemanship, in which is introduced the most rational mode of shoeing then practised. Neither should we omit to mention the *Infermita, & suos remedii, del Signor Carlo Ruini*, published in Venice, 1618; from which Snape, Gibson, and most of the early French authors, have copied their anatomical plates. In 1654, the *Grand Maréschal Francois*, a meritorious work, said to be composed by many hands, appeared. In the latter end of this century, the art received a very great addition from the elaborate work of Sollysel, whose attention was drawn to the subject from his situation as manege or riding master; and as the practices of this school were at this time in great repute, it followed that the treatment of the diseases of horses became very much confined to the professors in this art. It will not, therefore, excite our wonder that almost all the treatises on veterinary medicine of this time are found united with systematic equitation; and although, as regards Sollysel, the cause was not injured, but the contrary, yet generally it may be considered, that to this union of arts, as practised by persons not medically educated, we may attribute the small progress made by veterinary medicine during this period, compared with the advance of human medicine at the same time.

The eighteenth century produced numerous writers on the subject, and was destined to witness important improvements in the art. My notice of the works which appeared will be little more than nominal, and will embrace those only which have operated the most in beneficial influence on it. In 1733, Garsault translated Snape into French; and, about the same time, La Guiriniere's *Ecole de Cavalrie* appeared, which contained much on the diseases of horses. In 1746, Garsault published his *Nouveau parfait Mareschal;* and, with small intervals between, the *Amphitheatrum Zooticum* of Valenti, the *Parfait Mareschal* of De Saunier, and the *Zooticum Democritæa*, made their appearance. In 1761, France set the notable example of establishing, under royal patronage, a public veterinary seminary at Lyons, having the celebrated Bourgelat for its professor: his medical and anatomical works were numerous, and are well known. In 1766, a second public school was opened at Alfort, near Charenton, in the neighbourhood of Paris, and others subsequently at Strasburgh and Montpellier: establishments of the same kind have likewise since been organized in almost every European country, as Vienna, Berlin, Copenhagen, Dresden, Leipsic, Prague, Munich, London, Hanover, Naples, &c. &c. In Russia, also, a veterinary school has been founded, over which I was invited to preside.

As a cotemporary with Bourgelat lived the elder La Fosse, a name that will ever be respected in the annals of veterinary medicine. La Fosse made numerous improvements and discoveries, which he usually communicated in the form of memoirs to the Royal Academy of Sciences in Paris. In 1754, he had collected these into one volume, which was quickly translated into other languages, and diffused over Europe.

In 1766, La Fosse, junior, who occupied the same situation his father had held (that of farrier to the lesser stables of the king), presented his *Guide du Maréchal*, a work well known in this country, though I am not aware that it has ever been translated into English: the anatomical part is concise, and accompanied with some good plates. But his principal production was the *Cours d'Hippiatrique;* and consisted of sixty-five folio anatomical plates, coloured after nature, with corresponding descriptions in letter-press. After this he published his *Dictionnaire d'Hippiatrique*, in 4 vols., which is but little known in England, although, at the time it appeared, it was certainly the best practical system of farriery in existence. The year 1776 produced a very extensive work by M. Vitet, and, had the execution been equal to the plan on which it was intended to be formed, the work would have been an excellent one; as it is, its principal merit consists in an analysis of authors. There was also published in Spain, about this time, a very voluminous work on veterinary medicine, in nine volumes; but of which I know no particulars. The French revolution for some time disturbed the course of veterinary improvement; but the calm which succeeded employed the talents of many eminent veterinarians; and the names of Chabert, Flandrin, Gilbert, Vicq-D'Azyr, and Huzard, stand conspicuous on this list. Among the writings of these times may be noticed, The Rational Dictionary of Medicine, Surgery, and Farriery, in 6 vol. anon.; A Veterinary Dictionary, by Buchos; A Treatise on the Mange of Horses, by Chabert, as well as another on the Peripneumonia of Black Cattle. A work called Instructions and Observations on Domestic Animals, with an analysis of previous authors, was the joint produce of Chabert, Flandrin, and Huzard. The same gentlemen also united in producing a Veterinary Almanack. Chabert and Huzard likewise joined their talents, and published a Treatise on Glanders. From this time to the present, the writings on the veterinary art have become numerous in every country, but more particularly in France, and it follows that, in the course of our labours, many of the most popular will be quoted, as Hurtrel D'Arboval, Dupuy, also with Huzard (father and son), &c. &c. To Girard we owe much on the anatomy of the horse, and his work forms the text book of the Alfort school. The inquirer may also consult Hurtrel D'Arboval's Veterinary Dictionary with advantage. The works of later veterinarians, likewise, may be met with in the French Libraries of Paris and of London also.

SECT. II.

A CONCISE HISTORY OF VETERINARY MEDICINE IN GREAT BRITAIN.

THE healing art, as applied to a curative treatment of the diseases of our domestic animals, was, with us, even longer buried in gross ignorance than with our French and German neighbours; and when, at length, emulation had excited us, our early attempts were more the effects of an imitation of our French and German neighbours, than native improvements of our own. It, however, worked a favourable change among us, when manege riding became prevalent; for although the medical treatment of horses particularly, had not yet emerged from the hands of those immediately connected with the persons of the animals, yet, as the teachers of equitation were much more enlightened than either blacksmiths or grooms, the medical practice required necessarily became conducted on better principles. The manege gave place, towards the close of the seventeenth century, to horse-racing and hunting, which again threw the care of the health of the horse back to the currier of his hide and the shoer of his heels; and this æra witnessed only feeble and occasional efforts to rescue the valuable art of curing his diseases from ignorance and barbarity.

Blundeville, who lived in the reign of Elizabeth, appears to have been one of our earliest veterinary writers. His work, which was chiefly a compilation from ancient authors (of which he translated several into English), was fettered with his attachment to the manege. Subsequent to him appeared Mascal, Martin, Clifford, and Burdon. About this time also lived the celebrated Gervase Markham, whose Treatise on Farriery, though empirical and absurd, went through numerous editions, and became the guide of the practitioners of that time. The reign of James the First produced little original writing, but several translations from the Italian, German, and French. In the time of Charles the Second appeared *The Anatomical Treatise on the Horse*, by Snape, farrier to his Majesty. The plates are copies from Ruini and Saunier. His descriptions are likewise taken from these authors; and where he deviated from them, he made the human body his guide. About this time, an epidemic contagion raging among the black cattle of this country, produced many publications on the subject; one of which, by a Dr. Layard, was highly spoken of. In the reign of George I, Sollysel's celebrated work was translated by Sir William Hope, from the French, which tended to combat many of the errors at that time prevalent. About the middle of the last century, the art experienced still further improvement by the labours of Mr. Gibson, who was originally a surgeon to a regiment of cavalry; from which situation it is probable he was first led to turn his attention to the diseases of the horse, and by which he was, at length, enabled to present the best treatise on farriery that had appeared in the English language. It is said, he afterwards lived in *Duke Street, Grosvenor Square*, where he practised with great reputation. He appears to have written several books; but his principal work is that before alluded to, which was published in quarto, with anatomical plates copied from Snape or Ruini, and called *The Farrier's Guide:* but, though his anatomy was incorrect, and the functions and economy of the organs almost overlooked, yet his treatment of diseases was generally judicious, and his account of symptoms accurate and interesting; and, as he was guided mostly by his own observation, so he became the best writer and practitioner of his day.

As a contemporary with him, lived the celebrated and eccentric physician Dr. Bracken, a man of considerable erudition, a sportsman, and a wit of a peculiar cast: his works have been as much admired and read for the peculiar style in which they are written, as for the real information they contain.

Bartlet, who was a successor to the two former, was likewise a surgeon: he formed himself on the model of Gibson and Bracken, and he gave the sum of their treatment in a much more compendious and practical form. He likewise benefitted the art, by translating La Fosse's improvements and discoveries: but Bartlet is to be noticed principally as a copyist and compilator, for he brought forward little of his own, except a cruel and absurd alteration in the mode of nicking.

To him succeeded Osmer, who was also initiated a human surgeon, but afterwards practised as a veterinarian in *Oxford Street.* His ***Treatise on the Lamenesses of Horses***, with an improved mode of shoeing, is most deservedly esteemed, and his practice was adopted, with some slight alterations, by the late Mr. Morecroft. He first commented upon La Fosse's method, and pointed out the excellence of his mode of treating the feet; at the same time shewing that the short shoe was inadequate to the support and protection of the foot in the present improved and hard state of our roads. The practical part of this treatise on lamenesses is likewise excellent, and will hand his name down as one of the early contributors to the success of the art. The next luminary in the veterinary horizon was Clarke, of Edinburgh, the king's farrier for Scotland, whose excellent ***Treatise on Shoeing and the Diseases of the Feet*** was afterwards followed by one on the ***Prevention of the Diseases of the Horse*** generally; these succeeded the able dissections and engravings of the Myology of the Horse, by Mr. Stubbs, the professional horse painter, who, to high excellence in his art, added a very considerable knowledge of the general anatomy of the animal.

THE HISTORY OF THE VETERINARY COLLEGE.

The period of the establishment of a National School will ever remain a memorable epoch to the veterinary amateur, as being that from which the principal improvements in his art are to be dated. Charles Vial de St. Bel first published proposals for founding a veterinary school in the year 1788; but the plan meeting with no support, he returned to France. This gentleman was professionally educated at the Royal Veterinary College of Lyons, and, as we are told, afterwards became junior assistant at Alfort. In 1790, he made a second visit to England, which proved more successful; for, on again renewing his proposals, they were noticed by the Agricultural Society of Odiham, in Hampshire, the members of which, convinced of the utility of such a measure, proposed to form an institution, called *The Veterinary College of London*, and to appoint St. Bel to the professorship; the writer of this account being engaged as his assistant. It was in February 1791, that the first organized meeting of the supporters of the society took place at the Blenheim Coffee House, Bond Street, at which time many new subscribers enrolled themselves. His Grace the Duke of Northumberland condescended to become the president; and such was the general opinion of the importance of the subject to the country at large, that vice-presidents and directors offered themselves from among the most distinguished characters for rank and talent. A house was next taken for the purposes in view at Pancras. Pupils were received to board with the professor; and the writer of these pages was also located there as translator and anatomical demonstrator. To me it has, however, been a matter of surprise that the concern succeeded to the extent it did; so totally inadequate to such an undertaking was St. Bel. That he was enterprising and ingenious no one will deny; he was also indefatigable in promoting the interest of the establishment, which indeed involved all his future prospects; but that by his knowledge of the anatomy, physiology, and pathology of the horse he was fitted to become the veterinary professor, no one of those who most strongly supported him can believe. His writings and his practice bear me out in this opinion; aud his election to the chair could have alone arisen from a wish that such a school might be established; and it could only have occurred because no other person then in the kingdom was better able to undertake its management, that his examination, which took place in 1792, by the most eminent medical men of the day, was passed over as satisfactory. Nevertheless, St. Bel was possessed of such good natural abilities, and had the welfare of the institution so much at heart, that I make no doubt his deficiencies, had he lived, might have been in a great measure made up by application.

In March 1792, it was resolved, that a temporary stabling for fifty horses, and a forge for shoeing, should be built near the house taken for the college; but which the Professor was hardly permitted to witness, for he was attacked with an illness in August 1793, which proved fatal in about a fortnight.

St. Bel's works were, an *Essay on the Geometrical Proportions of Eclipse; Lectures on the Elements of Farriery;* the *Art of Horse Shoeing, and Diseases of the Feet;* and *a volume of Posthumous Works*, collected for the benefit of Mad. St. Bel. The treatise on the Geometrical Proportions of Eclipse, which gained its author many admirers, owed much to the embellished style of the accomplished Mr. Penn: the subject matter itself may be seen, with little alteration, in the first volume of Bourgelat's *Elemens d'Hippiatrique,* published at Lyons in 1750. Nor can his Lectures on the Elements of Farriery claim any greater originality, they being mostly servile copies of La Fosse's writings.

On the death of St. Bel, the public attention was of course engaged in considering on whom the vacant professorship would devolve: some eyes were directed to myself; many more to Mr. Clarke, of Edinburgh, who, however, refused it. Mr. Morecroft, then in practice as a veterinary surgeon, was unquestionably the most eligible person. Mr. M. was originally a student of human medicine; but he had lately studied veterinary medicine in the French schools, and was considered to possess extensive information on the subject. Mr. Coleman, a medical pupil of the Borough hospitals, who had much distinguished himself by some physiological inquiries, and by some experiments on the diseases of the eyes of the horse, was brought forward likewise, although his designs had never, I believe, reached further than this, nor had his attention at that time ever been engaged beyond that point. The fitness of Mr. Morecroft was, however, so nicely balanced by the interest of Mr. Coleman, that it was determined to unite them in the professorship; and, with the practical knowledge of the one, and the investigations of the other, every thing was to be hoped from the association. Unfortunately for the institution, Mr. Morecroft, finding that he had quitted a profitable concern for one which held out little prospect of gain, soon seceded; and Mr. Coleman, who now applied himself to fill up by his own talents the loss of his colleague, was appointed sole professor. The general establishment, also, at this time received some important alterations; in proof, a theatre for the delivery of lectures, with a dissecting room and museum, were erected. A medical committee of assistance was also appointed, consisting of the most distinguished medical practitioners in London, by whom the pupils were to be examined, and, if found to have acquired a sufficient knowledge of the art, certificates were to be granted them. Pupils were now admitted to the practice of the institution, which, from the erection of a very extensive infirmary, and the encouragement it had received from the subscribers, had become a considerable field of medical practice.

A *regular* course of lectures was delivered throughout the season; and private dissections were also carried on, in which the pupils had the benefit of the instruction of the professor or his assistants. These advantages were received for twenty guineas, paid by each pupil on his entrance. It also should not be omitted in this place to note, that, by the liberality of the distinguished characters who composed the medical committee, the pupils were admitted to their lectures gratis, and this spirited example was afterwards followed by several other professors of human medicine. It would be inexcusable, also, if I proceeded without a tribute to that active promoter of every branch of the healing art, Mr. J. Hunter. Veterinarians will ever remember with gratitude how much they were indebted to him for his zealous promotion of this establishment. The country at large, in fact, fostered it as a rising plant; in proof of which, the British Parliament annually voted a sum for its support: and, as an inducement to young men of education and respectability to become students, George the Third granted the rank of commissioned officers to such veterinary surgeons as might be appointed to regiments. Under these encouragements the increasing concerns of the college soon required additional teachers, and Mr. Sewell was appointed Assistant Professor; and, subsequently, Mr. Vines and Mr. Morton have been added to the list of active and useful assistants.

Mr. Coleman's professional works, after succeeding to the college chair, were, first, a pamphlet *On the Formation and Uses of the Natural Frog of the Horse, with a Description of a Patent Artificial Frog.* The principles on which this invention was founded was the necessity of extended pressure to the well-being of the foot; but the application of the instrument was found too inconvenient for general adoption. Mr. Coleman's second veterinary publication, whether we consider the importance of the subject, the ability displayed in the anatomical execution of it, or the splendid manner in which it was got up, reflected the greatest credit on him. It was entitled *Observations on the Structure, Economy, and Diseases of the Foot of the Horse, and on the Principles and Practice of Shoeing*, in 2 vols. quarto. (See Shoeing, among the Operations.) It was likewise proposed, that a volume of *Transactions* should be published annually, the first of which appeared in 1801, and was entitled '*Observations on Wounds of Circumscribed Cavities.*' As might have been expected from the known talents of the author, much valuable matter was contained in it; but, unfortunately, the annual volume was not continued.

As every thing human is imperfect, so there is no reason to doubt that this establishment has its errors and defects also. But in allowing this, we must also admit that it has conferred incalculable benefits on the country; the proofs of which shine around us in the practice and writings of the many eminent veterinarians who have emanated from it. One consummation devoutly wished for has at length been obtained; which is, that the teaching and the practice of the college should be extended also to the anatomy, physiology, and pathology of the ox, the sheep, and the dog, as it is in the continental colleges. In the outset, we think it was prudent to confine the early attempts to the horse alone; and we are also well aware that, even now, local difficulties exist to the desired end, which nothing but time, perseverance, and adequate public support, can overcome: yet we do feel assured that the importance of the subject, to the country at large, will, in the end, bring about this desired addition; and then, and then only, the *veterinarian* will shine in the full attributes of his comprehensive name.

I shall now retrace my steps, and give, in succession, a short account of the principal veterinary authors who have appeared since a regular school was founded among us. In 1790, Mr. Prosser, a surgeon, published a *Treatise on the Strangles and Fevers of Horses*, which contained some judicious remarks on other writers, but offered little original matter. The year 1796 produced an elegant quarto from the pen of S. Freeman, Esq., an amateur of the arts of the manège, *The Description of the Structure and Economy of the Foot*, which was accompanied with a set of highly-finished engravings, by Skelton, of dissections made under the inspection of Sir Everard Home. That well-known and voluminous writer, Mr. John Lawrence, about the same time commenced his career in a small collection of extracts from St. Bel, Osmer, Clarke, and Lord Pembroke, and 1798 brought out his *Philosophical and Practical Treatise on Horses.* That portion of his work which embraced the general treatment of the horse was judicious and interesting; but the parts dedicated to the description and cure of his diseases, we think, were of the old school. Since that time, however, Mr. L. has become a voluminous and useful writer, on subjects connected with animals; and in him the rights of brutes have met with a powerful advocate.

In 1800, Mr. Morecroft published a small pamphlet, entitled a *Cursory Account of the various Methods of Shoeing Horses, with incidental Observations.* The mode of shoeing recommended by this well-known and highly respected author will be noticed in the course of the work.

In 1801, Mr. White, a veterinary practitioner, of Exeter, gave to the public a small *Vade Mecum of Farriery*. Such was the beginning of an extensive work now comprised in four octavo volumes. It is to be regretted that this work is so immethodical that half of its value is hidden or lost. Subjects that ought to be brought into one point of view are scattered through the various volumes in detached parts, and, at last, are finished in an *appendix*. The diseases of oxen, sheep, and dogs, as treated on by Mr. W., have not, in our opinion, increased his reputation: what he gave on these subjects were principally compilations; for, we believe, he was little engaged in any but horse practice. In his fourth volume, some additional remarks on hydrophobia appeared in the appendix, extracted from the pamphlet of Mr. Gilman. Mr. W., I make no doubt, was totally unaware from what source Mr. G. was enabled to give that *minute* account with which he favoured the public; but whoever will be at the trouble of comparing it with the description of rabies published by me in the fourth edition of the 'Domestic Treatise on Horses and Dogs,' three years before, will readily detect the source so glaringly and uncandidly drawn from.

The year 1801, likewise, produced a work of much merit from the pen and pencil of Mr. Richard Lawrence, of Birmingham, veterinary surgeon. It is much to be regretted, that, with such talents, he should pass over his subjects in so light and cursory a manner. The plates are elegant, and extremely well designed, particularly those that regard the proportions and paces of the horse; the portions dedicated to the internal structure and diseases are not quite so happy, but were sufficient to give a promise of future excellence, which we regret was never fulfilled. The work has been since re-edited, and published in an octavo volume, with some slight additions.

About this time, also, appeared Mr. Downing's *Description and Treatment of the Diseases of Cattle*, much of which is borrowed from Topham. This work is in considerable repute among farmers, graziers, and some farriers, and may be regarded as a pretty faithful, though melancholy, picture of this part of the veterinary art, as practised among the farriers of the old school and the cowleeches of the present time. 1803, also, produced a large quarto volume, by Mr. John Feron, veterinary surgeon to the 13th dragoons, entitled *A New System of Farriery, &c. &c.;* and, about the same time, Mr. Ryding's *Veterinary Pathology* was published.

1805.—This year brought forth the *Veterinary Dictionary* of Mr. Thomas Boardman, V.S. to the third regiment of dragoons, price £3..3s. This expensive and large work is a compilation from all the modern writers; and, if our author had made his selection with as much judgment as industry, it might have been considered as a very meritorious production. As it is, it may prove an useful reference; particularly as it gives fac-similes of most of the plates contained in the various works of merit that have appeared. Mr. John Lawrence gave also, this year, a very useful *General Treatise on Cattle,* which was followed in the next season by the very inferior productions of Mr. Francis Clater's *Every Man his own Farrier,* and *Every Man his own Cattle Doctor:* and, with no better instructions than these, it would be quite as well that every man should '*doctor*' his own.

In 1809, that very ingenious writer, Mr. Bracy Clark, of London, favoured the public with the first part of his *Dissertation on the Foot of the Horse, with Experiments on Shoeing,* which work has been since completed. The object of this elaborate and elegant publication is (by accurately describing the foot of the horse in its natural state, contrasted with its state after the animal has been some time worked in shoes), to enable the reader to comprehend the hurtful effects that the present system of shoeing, even under the best hands, has upon the foot. It is the author's opinion, that the application of an iron shoe by means of nails, as now practised, is the principal cause of the alteration that is found to take place in the feet of all horses after shoeing, and which alteration it has been usual to attribute to other causes. To remedy this, Mr. C. proposes an invention called the Paratrite, or shoe that may be applied without nails, having instead an elastic steel band embracing the hoof as its means of attachment; the details and figures of which appear in the third part. Mr. Clark's other works are, *A History of the Bots of Horses,* a work of great research, and one which has established the reputation of the writer among naturalists; *A Treatise on the Casting of Horses,* with an improved apparatus; *A Description of the Section of the Horse* (a very accurate figure accompanies this anatomical detail, and the philosophical examination of the general form is highly interesting); *An Essay on the Gripes of Horses,* in which Mr. C. introduces a more active treatment by means of an early administration of pimento, or allspice and spirit; *A Reformed Pharmacopeia,* &c. The art must ever acknowledge Mr. Clark as one of its most zealous advocates; but whether the classical dress into which he puts even the most trivial subject does not rather tend to the advancement of his own character as a scholar than to the display of his subject among the plain unlettered men who form the majority of veterinary practitioners, I leave others to decide.

1814.—This year, Professor Peale, of the Royal Dublin Society, made his *debut* as an author in a work which will long remain as a monument to his industry, zeal, and ability. It is entitled, *Observations, chiefly practical, on some of the more common Diseases of the Horse: together with Remarks on the general Articles of Diet, and the ordinary Stable Management of that Animal.* Mr. P.'s work is, at once, intelligible to the meanest capacity, and yet worthy the full attention of the most philosophic. In 1818, Mr. Wilkinson published *A Treatise on the Tetanus and Epidemic Catarrh of Horses.* If Mr. W. has not mistaken some other complaints for tetanus, which his clear account of symptoms and references to cases would seem to render unlikely, his treatment of this formidable disease has been very successful, and deserves general adoption. Such was our first statement: we have subsequently learned that the experience of other practitioners bears out the account of the excellence of the practice, and entitle Mr. W. to the gratitude of the profession. On epidemic catarrh nothing new appears. In 1820, *A New System of Shoeing Horses, with Accounts of the various Modes practised by different Nations; Observations on Diseases of the Feet, &c.* appeared from the pen of Mr. Goodwin, late Veterinary Surgeon to his Majesty. This ingenious writer, to whom the art is indebted for various improvements, has in this work, after inquiry into the causes of lameness, added an interesting account of the horse-shoes in use in other countries. His attempts appear to be directed to introduce a modified system of French shoeing, but with shoes to be forged of *patent malleable cast iron.* The system he advocates, to say the least of it, is ingenious, and the work in general is highly creditable to the author's talents; but so many difficulties stand in the way, that I question whether his plan of shoeing, well devised as it appears to be, will not follow many others that have preceded it.

1823.—This year stands recorded for offering the first volume of a *Series of Elementary Lectures on the Veterinary Art,* by Mr. W. Percivall, now Veterinary Surgeon to the 1st Life Guards, which are calculated, in an eminent degree, to advance the interests and the reputation of the veterinary art, by blending with the anatomy and physiology of the animal a faithful picture of his numerous diseases, and a plan of treatment for each, usually well devised and practicable. This gentleman, as co-editor of *The Veterinarian,* has also added much to the art we advocate, and much is due to his acumen. Mr. Bracy Clark, has likewise supported a useful periodical, with his usual ability, and warmed with a little causticity, ''Tis true 'tis pity, and pity 'tis 'tis true.' Mr. Cherry also has claims on our gratitude, in common with each periodical gatherer of the buds of science. It ought never to be lost sight of, that a periodical journal of any art is an encyclopædia, which contains not the acquirements of one individual only, however talented, but the knowledge and experience of the many; and in one important particular it is even superior: the Encpclopædia rests as it is; the Journal marches with the art it commemorates. It is a register of facts more than of opinions; and, by its means, many a spark is fanned into a brilliant flame, and many a talented but slothful genius is by such aid stirred up to appear in a page, who would sicken at the prospect of a volume. Neither is it one of the least of the benefits likely to accrue from it, that it will prevent many of the more remote practitioners from falling into the narrow and empirical practice of pretending to secrets and infallibles; on the contrary, we shall all take on a habit of preparing to give and receive, and of looking forward to a professional pic nic, to which every one will be happy to contribute his mite or his meal; which, like the bread cast on the waters, will eventually return enlarged tenfold. We regret that our limits, already trespassed on, deny us the pleasure of further enlarging on the subject; but we would refer the reader to the introductory address of the *First*

Number of '*The Veterinarian,*' for a masterly summary of the prospective benefits of a Monthly Journal of the Art.

As authors of minor veterinary publications, we believe the names of Orm, Denny, Pursglove, and probably some others, appear; as likewise a *New System of Shoeing Horses*, by J. Hodgson, of which report speaks well. Mr. Frederick Cherry has also produced a small but pithy work on the *Treatment of Horses' Feet*. Mr. Vines, late of the Veterinary College, has also laid us under obligation by his valuable Treatise on Glanders; and when Mr. V.'s professional opportunities, and his known disposition to make use of them, are considered, we need not wonder that his work commanded much attention.

We cannot conclude this sketch of the State of the Veterinary Art among us, without adverting to the advantages likely to accrue to it from the establishment of a Veterinary School in Edinburgh, having at its head an able and zealous teacher in the person of Mr. Dick. We heartily wish him all the success which his apparently judicious methods of pursuing his course of instructions merit. If Scotland be at all alive to her own interest, she will foster this rising plant with energy and liberality. Mr. Stewart has also distinguished himself in the same cause in Glasgow.

SECT. III.

OF THE PROPER MEANS FOR THE ATTAINMENT OF THE VETERINARY ART.

THE mode in which any art is attained must be, in a great measure, directed by the future views of the learners. It appears to me, that there are three distinct classes of persons who are likely to study this branch of useful knowledge. The first is composed of persons of fortune, with enlarged minds and a more than usual attachment to field sports, particularly those in which horses and dogs of the best breeds are employed. A striking instance of this presents itself in the mass of excellent observations on the diseases of these animals. These breeds being naturally inclined to become injured more than others, require vigilant care from their owners, particularly in arresting the progress of threatened ailments. A *second class* may be formed from country and village surgeons, whose services may render them highly useful upon occasions when no farrier is at hand, or in cases in which farriers of the common class are unable to judge.

Gentlemen and amateurs, who wish to accumulate information on this curious and interesting subject, within the reach of the Veterinary College, will find their account in attending a course of lectures there: when this is inconvenient, Mr. Richard Lawrence's work may be read with advantage. The following pages, we hope, will afford still further instruction in the anatomy, physiology, and pathology of the horse; and the deficiencies left by the above may be ably filled up by reference to Mr. Percivall's excellent *Lectures*.

A good surgeon has travelled three-fourths of the road towards making a good veterinarian; but he must diligently travel the remainder to arrive at excellence. He must by no means sit down contented with the analogy between the human and brute subject, or he may be led into very great error; for though this analogy is, in some cases, very striking; yet there are others in which the similarity fails, and he is left to act upon other principles. The digestive organs of man and the horse are anatomically so different, that their functional purpose cannot be altogether the same; and the peculiarity of the stomach of the horse renders the operations of medicines very different in him to what would be produced on the human stomach. Four grains of tartarized antimony would excite vomiting in most men. Four drachms would not even produce nausea in a horse. Many similar instances might be adduced to shew the necessity for a conversance with such anatomical variations from the human structure and functions, as will naturally lead to variation in the medicinal practice also between them, of which the feet form a notable instance. The specific diseases, as glanders, farcy, strangles, grease, &c., must also occupy the human surgeon's particular attention; as here all analogy would fail. It has also happened, that medical gentlemen have wholly abandoned the human for the brute practice, and our art exhibits some bright examples of this conversion. Mr. Coleman, we believe, was not friendly to this change; and if he meant that there was neither sufficient remuneration, nor a sufficient honourable consideration held out by the world to warrant the step, we go with him in all ordinary cases. But if, as we are informed, he was of opinion that the human surgeon usually makes a bad veterinary practitioner, then we are constrained to demur. The Professor himself is a proof, as well of the qualifications being readily transferrible, as that unmixed respect in the truly eminent may equally accompany both characters.

The third class of veterinary pupils is composed of farriers already practising, or who intend to practise, this art exclusively. To such persons it must be evident, that entering themselves at the Veterinary College is almost essential to their future success. It is there that they must pass their noviciate; it is there that they will enter on their studies in company with others who having been somewhat longer engaged in the same pursuit, will point out the methods of applying successfully the opportunities that will be presented to them; and it is from thence, under the sanction of a diploma there obtained, that they will enter on their professional practice with the confidence of their employers. It is, however, to be recollected, that even the Veterinary College possesses no royal road to learning. The professors pretend not to this: they find the means; it is the student must apply them. He must, having made himself familiar with the skeleton, diligently, carefully, and minutely, dissect every part of the body of the horse, the ox, sheep, swine, and dog. 'How will you,' asks the writer of an able article in *The Veterinarian*, No. 4, 'repair the machine unless you perfectly understand its construction? There is scarcely a disease—there is certainly no operation—in which accurate anatomical knowledge will not only be useful, but absolutely necessary.'

Physiological inquiry should accompany the study of anatomy: they ought ever to be inseparable: both are essential to successful practice. If we are ignorant of the physiology of organs, our knowledge of their construction will comparatively do us little good. 'If, for instance, we are ignorant of the action of the diaphragm in the office of respiration, how can we possibly have any conception of the symptoms attending a wound of that muscle?'

Should the student meditate practising to the full extent of his designation as a veterinarian, which is on other domestic animals as well as the horse, it will be requisite that he acquaint himself fully with comparative anatomy; such acquirement will assist him greatly, even as an hippiatrist; but as a veterinarian it is absolutely essential. The most perfect anatomical knowledge of the horse would not inform him where to puncture the paunch of the hoved ox. A consideration of the structural peculiarities of the same organs in different animals, according to their several wants, and the difference of function occasioned by structural peculiarity, are matters of philosophical interest to all; but it is imperatively necessary that the veterinarian be well informed with regard to the variations of disease resulting from such singularities of structure and function.

The general observation of diseases may accompany the study of anatomy and physiology; but an undivided attention to them should be reserved until some progress has been made in those studies which are to lay the foundation for just principles, and just conceptions of the nature of disease. Merely to observe and note what medicines are given in different diseases leads to an empirical practice, and utterly defeats correct and enlarged views of the *curative practice* generally. A course of dissections being finished, diligently attend the sick cases; and never neglect accompanying the professor in his rounds. Note down his remarks, minute the symptoms as they occur, the changes which take place, and the effects produced by the various medicaments which are applied. Carefully examine the pulse in every sick case, many times in the day, and under every variety of circumstance; accustom yourself also to a frequent examination of the healthy pulse in different horses; by which anomalies will become familiar, and prevent error in applying your knowledge to disease.

It ought to be unnecessary to advise the pupil to a sedulous and regular attendance on the lectures of the professors of his college, to whom a marked respect on all occasions is both proper and prudent. It is equally so, that, by obliging attentions, he should ensure the good offices of the inferior officers of the establishment. As a secondary consideration, attend the lectures also of those eminent teachers of human medicine, whose liberality have opened their doors to your free admission; but avoid doing this until a complete course of the college lectures has been attended; and do it then only when no veterinary therapeutics can be interfered with. Of your college lectures, never for any object of pleasure miss one; and uniformly apply what you hear to some practical purpose; either real if it be present, or imaginary if not: of all the modes of impressing what you hear on your memories, this is the most infallible.

Chemistry and the materia medica should form a part of the collaterals of your medical studies. A certain acquaintance with individual drugs is acquired by use and observation; but a knowledge of their products, when in a state of combination, can only be gained by conversance with chemistry, on which subject more will appear in the MATERIA MEDICA. The veterinary student has now no excuse for a want of information on the elements which enter the composition of medicinal agents, Mr. *Morton's Manual of Pharmacy* having well filled up this hiatus. Every veterinary student should immediately make himself master of the contents of this invaluable *vade mecum*; pages 27, 28, 29, and 30 particularly, are too important not to require much of his attention.

Form no theories; accumulate facts, and study them; it is by observation and experience that you are likely to become a successful practitioner. During the latter periods of your novitiate, visit the knackers, examine every diseased case: purchase the permission to operate, first on the dead subject until you are *au fait*, and then finish with the living. Cultivate a humane disposition towards animals generally: nothing disgraces the veterinarian, or disgusts his employers, more than a seeming indifference to the pain he is sometimes forced to inflict. Make experiments when necessary—never do it wantonly; and when it is done, make no parade in announcing it: on the contrary, the less is said about such matters, the better.

Remain at your studies as long as your finances will allow you. Solid acquirement may be gained in two years, but no time must be wasted: four years are thought necessary at the French colleges. Should your stay be necessarily shorter, employ the time you have in such studies as cannot be readily pursued hereafter. These are, the fundamental principles of anatomy, the method of operating, the knowledge of disease, and the curative practice, not only of your own school, but of the best veterinarians around also. But when from circumstances, farriers, or other persons intending to practise, cannot possibly attend the Veterinary College, still let them not despair; improvement is yet within their reach; and, provided they will be content to enter on a systematic and regular plan of accumulating information, the difficulties will give way. Here the principal dependence must be placed on books, and particularly on such as have plates to guide the anatomical research, which here, as well as at the Veterinary College, must form the foundation of the whole. On which subject we would refer the inquirer to some excellent instructions contained in No. 4 of *The Veterinarian*, where, after recommending Mr. Percivall's *Lectures* and our *Outlines* as anatomical guides, it adds, 'You may safely follow them both, and neither can be spared. Begin with the skeleton: the large plates published originally in *Blaine's Folio Anatomy*, and similar ones published by Kirtland, may be procured.' In addition to these, I would also recommend *Boardman's Veterinary Dictionary*, as containing numerous anatomical plates copied from many sources. Much may be likewise gained from the excellent *Treatise on the Horse* in the *Farmer's* Series of the Library of Useful Knowledge. It is, or ought to be, in the hands of every admirer of this animal, and will be found to deserve the closest attention of the veterinary student also. In prosecuting dissection, any small animal may be begun upon, to accustom the learner to the necessary manipulations. General instructions in this art may be obtained by reference to the *Dissector's Assistant* of Parkinson, which will open the way to pursuing the study on the body of the horse itself. The anatomy of the various organs, and the surgical operations required on them, may be gained by careful attention to these pages, and to those of Mr. Percivall, as guides; where, also, the theory and practice of veterinary therapeutics throughout may be learned. We hardly need remind the veterinary student, that, independent of all well-known writings connected with his studies, he should particularly possess himself of every monthly journal connected with his art. It is the especial province of each of them to register every improvement as it occurs. We hardly need to hint, that *The Veterinarian* stands pre-eminent among these.

SECT. IV.

THE NATURAL HISTORY OF THE HORSE.

As a zoological member, the horse (Equus Caballus), although united by Linnæus with the hippopotamus in the order *belluæ*, would be more justly characterised as forming an isolated genus, totally unconnected with any other group of mammalia than the members of his own family. These several family members, as *E. Hemionus* (the Dziggtai), *E. Assinus* (the Ass), *E. Quagga* (the Couagga), *E. Zebra* (the Zebra), and *E. Montanus* (the Dauw), are all equally distinctly characterised by having the quadrupedal phalanges united into a single finger or toe, closely enveloped within a compact cylindrical hoof* ; as well as by the peculiarity of their dental organs, which in all present incisors $\frac{6}{6}$; canines in the males $\frac{1}{1}$: $\frac{1}{1}$ molars $\frac{6}{6}$: $\frac{6}{6}$.

The specific characters of the horse place him in an eminent degree above his congeners in dignity and beauty: these are, a long tail covered throughout with hair of great length, and a flowing mane of considerable thickness. We attach little speciality to the absence of the humeral stripe, so common to the other members of the genus, although it is much insisted on by naturalists. The longitudinal dorsal list is very common to many horses of mixed colours; and we have seen faint but evident traces of the shoulder cross also.

The horse is considered to have been originally a native of what is called the old world, and by the industry of man to have been planted in the new†. It appears from the sacred records, that his subjugation did not take place until many years after that of the camel and the ass. It is said our earliest accounts of horses relate to their being sent into Egypt by Jacob to bring corn during the famine which raged in Canaan; but still more certain proofs exist, that, when the Israelites returned into Canaan, these animals had become common; for the Canaanites 'went out to fight against Israel with *horses* and chariots very many‡.' From Egypt the horse was carried into Greece, and this at an early period; for the Olympic games, where horses and chariots are celebrated, existed 1450 years before Christ. The industry of man devised means to spread them almost universally, at times very remote from the present; for all our continents, New Holland excepted, exhibit horses with every appearance of having been long wild. In the plains of Great Tartary, the droves of wild horses are immense; and some eminent naturalists favour the opinion that it was here the horse first appeared; while others contend that the present races do not exhibit the original stamp. We may fancifully imagine to ourselves an original stamp, and without doubt such a stamp would be perfect for the situation it was placed in, and for its own physical wants and necessities; but it is evident that the wisdom of the Great Creator, if he actually formed only one type, would have chosen a different mould for him, in the arid sandy plains of the east, where vast distances must be traversed in pursuit of food or in retreat from foes, to that which would have been appropriate in more temperate climes, where a luxuriance of herbage and never-failing springs nourished the bulk, and rendered extensive travel unnecessary. And as the distance of only a few degrees operates much change in the form of the indigenæ, so, unless we could fix the precise spot of the æquine Eden, we are yet unable to pourtray the original type. We are equally at a loss with regard to the colour of the early breeds; for that also varies in indigenous animals, according to their residences. Adapted to climate, we find the horses of different countries (and even such as nearly, if not wholly, approach a state of nature) either slender as the deer, or bulky as the ox; and while the Shetlander is little more that three feet in height, and occasionally even less, the lofty Norman overtops eighteen hands frequently. In the east, the coat is glossy, short, and smooth; in the north, it is thick, curled, and of great length.

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* This uniformity of structure throughout the genus completely excludes the attempts of Molina, and some other naturalists, to class the Huemul of Chili with the horse, under the name of *E. Bisulcus*, or cloven-footed horse. We might with equal, and even with more, propriety, include the camel: both are equally ruminants, and the camel has incisors, whereas the huemul has none. It is, therefore, a matter of surprise that these well-marked characters of the genus should, instead of symplifying its systematic arrangement, have rather tended to confuse and mislead naturalists. Baron Cuvier first adopted the classification of Storr, who formed a distinct order for it, under the term solipedes (by others solidungula); but, finally, he classed it under the pachydermata. Linnæus, as already observed, had united it with the hippopotamus, and Erxleben placed it between the elephant and dromedary.

† The original country of the horse is, however, disputed on many grounds: some naturalists favour an opinion that he is truly indigenous to most countries of the globe. Dr. Fleming, on the *British Animals*, says, 'That the horse should be regarded as indigenous need scarcely require proof. It lives and propagates nearly in a state of nature in the Highlands of Scotland and the Zetland Islands. The remains of the species occur associated with those of the most ancient of our quadrupeds, as in the cave of Kirkdale' (*Buckland's Rel. Dil.* p. 18). Fossil bones supposed to belong to the horse have likewise been found at Hatfield, in Yorkshire, and in the Isle of Dogs, Middlesex (*Parkinson's Org. Rem.* vol. i, p. 67-95). Cuvier, however, appears to doubt their characters being genuine (*Ann. de Museum*, tom. xiv, p. 33).

‡ 2 Chron. i, 17.

The Grecian arms spread her horses over Spain, Persia, Barbary, and Arabia, from whence they became disseminated throughout the northern and western parts of Europe, while the decline of the Grecian glory gave to Rome, for a long succeeding period, the future culture of the animal, and the fame of his glory.

At what precise time foreign horses were first brought into Britain is uncertain; but it is not improbable that it was at a very early one, since history informs us they were sufficiently numerous, and their uses well known, when Julius Cæsar invaded the island. Whether these early horses were the entire produce of Britain, or whether they had already been mixed*, it is likely that their intercourse with the Roman cavalry would introduce new races, as diversified as the countries from whence the Romans themselves drew their own immense supplies. Freed from their conquerors, the English cultivated the arts of peace, and were consequently not unmindful of the horse, which was become, as early as A.D. 930, so valuable that Athelstan prohibited their exportation.

William the Conqueror brought with him the means of greatly improving the island horse; and the barons who accompanied him, being spread over the kingdom in their newly-acquired estates, rapidly diffused a valuable mixture among the native breeds. One of these nobles, Roger de Belesme, Earl of Shrewsbury, is particularly celebrated for introducing Spanish stallions into his Welch possessions†.

In 1121, the first Arabian horse on record was imported into England, and the crusades, which soon succeeded, were the means of introducing a large accession of eastern horses from the Levant. The traffic in horses now began to assume much of its future character: Smithfield was established as a horse-market; and the dealing in this animal was already become a regular profession, as well as already garnished with much of its trickery*.

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* Our early records inform us, that, when Julius Cæsar landed in Britain, our scythed chariots, drawn by horses in the highest state of discipline, produced terror throughout the proud legions of the conqueror; and that, on his return to Rome, he took with him some of these war-horses to improve the Roman breeds. It has, therefore, been questioned whether what may be called the indigenæ of Great Britain, as the ponies of England and Wales, the shelties of Scotland, or the hobbies of Ireland, could have furnished them. From whence, then, did the ancient Britons derive this breed? Had they already opened a communication with France or Germany? Or had they, by cultivation, improved the size and strength of the parent breeds in their lowlands?

† Michael Drayton quotes the excellencies of this breed in the sixth part of his *Polyolbion.*

To Edward the Second the breed of English horses owes much of its early improvement: he procured cavalry horses from Lombardy, Italy, and Spain, and heavy draught horses from Flanders. From this time the public attention appears to have been particularly directed to the necessity of improving the breed of horses; and many public ordinances were promulgated to that effect. In the reigns of Henry VII and VIII, it became common to import foreign stallions for this purpose from Barbary and Spain; and, in the two following reigns, others were imported from Belgium, Flanders, and Denmark; and as the former were intended to improve the speed, spirit, and beauty, these latter added greatly to the size of the future breeds. As early as the twelfth and thirteenth centuries, there were horse-races in England; but these appear to have been principally confined to trials of speed and continuance over uncertain grounds between native horses. In the reign of Henry VIII, horses either procured from Barbary, or bred from such, were expressly used for this purpose; and we may date the systematic improvement in the breed, by the admixture of what we call *blood*, to have its origin about this time.

James the First pursued the same system, and imported from Barbary a set of the finest mares, for purity of breed and excellence of form, which could be procured: these, known significantly as the ***Royal Mares***, greatly assisted the general purpose. James also imported an Arabian, whose own qualities, as well as those of his produce, not answering to the expectations raised, the breed for many years became in disrepute. Regular race-courses were at length established, and racing was conducted on fixed principles and confined within rules. Charles the First also encouraged these sports, and to him we owe the establishment of the Newmarket course; and in such estimation were they, as connected with the national good, that even the fanaticism of Cromwell gave way to it, for he also had his stud of race-horses. The Restoration gave a new impulse to racing, and a new impetus to the improvements meditated. The Arabian was again resorted to, and, on the renewed trials, his proceeds justified the former expectations. From that time to the present, by a judicious mixture of *crossings* of the native and the eastern horses, in different degrees of consanguinity, according to the different purposes for which they are required, we now stand unrivalled among nations; and we now send our breeds back to eastern countries, to meliorate that *blood* which we originally borrowed from them.

THE EXTERIOR CONFORMATION OF THE HORSE.

The *linear proportions of the horse* form a branch of knowledge that very properly precedes a consideration of his internal structure; and the animal, considered generally, may be divided into head, neck, trunk, and extremities: the different parts comprising each of which have various terms of art in general use appropriated to them; and it has been found, from long experience, that there is a peculiar form for each of these that is best adapted either to the general purposes of the animal, or to the uses we put him to. Nevertheless, it is not possible to reduce any of these within a geometric scale; hence, limiting the figure to a square, and giving various standard measurements for his separate parts, is not found by experience to assist the judgment: on the contrary, it proves fallacious, and leads into erroneous conclusions*. Nature will not be limited, and the perfection of her operations is not dependent on exterior symmetry only, but on a harmony and accordance of the whole, internal as well as external. In considering a horse exteriorly, his age, his condition, and other circumstances, should be taken into the account; and to determine, with precision, the present powers or the future perfections, can only be acquired by an union of science and experience. A horse of five years' old, though considered as full grown, yet undergoes very considerable alterations in his form between this age and seven or eight. At these latter periods he becomes what is termed *furnished;* his points all shew themselves; that is, he is in fact more angular, and, in a painter's eye, would be more picturesque, though as far as round lines are concerned, might perhaps be considered as less beautiful. A horse, likewise, very low in flesh and condition, is not the same animal as one full of flesh and in condition; and the sleek fatness of full and gross feeding, where little exercise is used, will not beget the robust form acquired from generous diet with corresponding exertion.

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* As a guard against these deceptions, warranty was now established. A buyer was allowed three nights to ascertain whether his purchase was free from staggers; three months to prove the soundness of his lungs; and a year was granted to try him against having received the infection of glanders. The well written account of the horse which appears in the *Farmer's Series of the Library of Useful Knowledge*, among other interesting matter, furnishes the prices of horses in these early days. A foal under fourteen days of age was valued at fourpence; at a year and a day, forty-eight pence; and at three years, sixty-pence. A short period only increased the price to thirty-shillings; and a century afterwards good horses fetched ten pounds: so rapidly did the breed improve, and the benefits derived become apparent.

To give any determinate figure for the horse argues a confined mode of reasoning. We may, it is true, fancy the *first* horse, which, though then perfect, would not remain so long in the opinion of those who used him, when they began to divide his powers and uses into heavy draught-horses, light draught-horses, race-horses, hunters, hacknies, &c. &c.

The *head* is a very important part, considered with a view to the beauty of the animal; and in no part is an improvement in the breed so soon detected as in this. Can any thing be conceived more dissimilar than the small inexpressive features attached to the enormous head of a cart-horse, compared with the bold striking lines which grace that of the blood-horse? The head, in the improved breeds, is small and angular, the eyes prominent, the ears spirited, small, and pointed; the forehead wide, straight, and sometimes slightly curved inwards at the lower part; in them the facial angle is about 25°, whereas, in the heavy breed, it is more generally 23°: its junction with the neck also is less easy and elegant than in the improved kind.

A superficial observer might, perhaps, overlook the extreme beauty there is in the head of the horse; and particularly the great fire and expression of his countenance when animated by any leading passion, which is to be the more admired, when it is considered how few aids this part has in the brute, compared with the human. Man borrows much of his facial expression from his eyebrows, and, when to these the varied action of the mouth is added, it amounts to more than a half of the total expression. Upon studying the Greek and Roman models, one is led to form but an unfavourable opinion of their horses, from the heavy inelegant heads that are presented to us in their studies and pictures; and if we were not aware that the Greeks, at least, derived their horses from Egypt, we might suppose that they despised the lighter and more animated breeds. We are, certain, however, that their artists too often studied imaginary heads, compounded from the human and brute countenances, as is evident from the sunken eyes, overhanging eyebrows, contracted nostrils, with lips thick and generally wide apart, as observed in their statues and pictures.

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* Mr. Clark seems to be of a different opinion; and, consequently, in his *section of the horse*, he lays great stress on the uniformity of these proportions, and the advantages resulting from a knowledge of them. These admeasurements are of French origin, and Bourgelat carried the system to a great length. M. St. Bel brought it to England: and his proportions of Eclipse were derived from this source.

The *ears* are usually supposed criterions of the spirit of the animal, and I have seldom seen a horse who carried one ear forward and the other backward during his exercise, especially if on a journey, but what was lasting and good. The reason appears a plain one: a horse of spirit, strong, and not easily fatigued, is attentive to every thing around him, and directs one ear forward and one ear backward to collect sounds from every quarter. I need not mention, that the ears are an indication of the temper of the animal; and that he is seldom either playful or vicious, but the ears are laid flat on the neck. It was kind in Providence to give us such a warning in an animal who does not want craft to surprise us, nor strength to render his resentment terrible. Now the custom is extinct, we can ask ourselves, From whence was cropping derived? The French deny it altogether, and say it was totally of English origin: whereever it originated, we can only wonder it was so long practised.

The *eyes* should be very particularly attended to in an exterior examination of a horse: the globe should be full and prominent, with a thin surface of eyelid. When it is small, or sunk within an orbit surrounded by much adipose or membranous substance, such eye is found more prone to inflammation than the former. It is prudent, however, to guard against too great a convexity of the globe, which now and then does actually exist, and probably renders the horse shortsighted. The eyes should always be examined in the shade: no better situation can be chosen than that the head of the horse be pointed *outwards*, but that his eyes remain half a foot *within* a stable door: the light now falling directly on the eye, will enable every defect to be readily seen. Viewed in front, the depths of the eye should be first looked into: the position of the looker should be then changed, and it should be viewed sideways, still from within the stable, which will much assist to ascertain the critical clearness of the parts immediately on and within the surface, and its freedom from central specks. See Eyes of the Horse in *Farmer's Series, Library of Useful Knowledge*, p. 84.

The *cornea*, or transparent part of the eye, ought to be perfectly clear throughout its whole extent of surface. Sometimes it will appear so on a slight inspection, but, when more attentively examined, opaque milky lines may be traced crossing its surface. In other cases nearly the whole may be clear, except the extreme limits, which will be found surrounded by an opaque line: when such an appearance exists, it bespeaks the remains of former inflammation, and a great danger of recurrence. It might, however, be proper to remark, that an accidental blow, as the stroke of a whip, may leave an opaque speck or line without any liability of recurring inflammation; but then very clear evidence ought to be obtained that an accident had really occasioned the blemish, and which in such case will seldom be found at the circumference. Not only must this exterior glassy covering of the eye be examined, but the attention should be likewise directed to the deeper parts within the pupil, the appearance of which, in a moderate light, should be perfectly transparent. In a strong light it should exhibit a lively bluishness; but if, in a moderate light, it appears turbid or milky, there has been inflammation, which will probably again recur; but if a speck or line of white more conspicuous than the rest should appear, in such case a cataract has already begun to form (see *Eyes* in *Splanchnology*). In other instances, again, though the internal eye should not appear opaque or milky, yet it may exhibit a glassy greenishness, which also is a proof of the existence of a most destructive affection, called, by the farriers, glass eye: but, properly, *gutta serena*. The existence of this may be proved by observing whether the iris, or the curtain forming the pupil, contracts and dilates; that is, when the hand is placed over a sound eye for a little time, the iris will dilate so as to increase the size of the pupil to admit more rays; but, on the removal of the hand, will again contract and lessen the pupil, to exclude them. A blind horse likewise usually carries his ears as though alarmed, in quick changes of direction, and hangs back on his bridle or halter, lifting his legs up very high; in fact, he presents every indication that a person blindfolded would do. When the iris, or moving curtain that immediately surrounds the pupil or opening into the eye, is of a lighter colour than brown, such horses are said to be *wall-eyed;* but, however it may detract from beauty, it no farther affects the eye. In some horses, the transparent cornea is small in its circumference, in which case the opaque cornea must necessarily be large, and shew much of the *white* of the eye. It is of consequence to distinguish such instances from others, in which, though the opaque or *white* coat may be of its natural dimensions, yet from the greater contraction and dilatation of the eyelid, more of it is seen. In the former, it is evident that the *white* of the eye shewing itself in a much greater degree, merely from a small superfices of transparent cornea, is the simple form of the organ, and can have nothing to do with the temper: but, in the latter instance, a large appearance of *white* may be received as an indication of a vicious disposition; for extraordinary motions of either the eyes or ears, and particularly where they act in unison, are consequences of the wants and passions of the animal. If a horse be suspicious, he generally looks out for opportunities to revenge former injuries, or to repel new ones; and the retroverted direction of the eye, in which, of course, much of the *white* is seen, is merely intended to guide the blow he meditates.

The *face* comprehends the part between and below the eyes: a spot of white or star in the forehead is deemed a beauty, but much white is a blemish. If white extends down the face, it is termed a *blaze;* and, when continued into the muzzle, it is called *blaze and snip*. If, with a star, white begins below the place of the *star*, and is then carried downwards, it is called *a race*. Thus, when a stolen horse is described, these distinctions become useful; and, in regimental accounts of the marks of horses, they are particularly attended to. Such an advertised horse is said to have *star, race,* and *snip* white, while another has a *blaze* only. All the lower part of the head, including the nostrils and lips, is called the *muzzle*. The darker the colour of this part, the more is the horse esteemed. Very dark brown horses are, however, an exception to this, for, in them, the muzzle is generally of a tan colour, which is also prized. The general contour of the face in our best horses is either that of a plane, or very slightly curved inward, but not equal to that of the native barb: our worst breeds arch outwards. The facial straight line is found on many, perhaps on most, of our esteemed racers, and of our well-bred hunters.

The *lips* themselves should be thin and well supported; when hanging loose and pendulous, they bespeak age, sluggishness, or debility; and it is of more consequence than is usually supposed, that their commissure, or the opening of the mouth, should be of sufficient extent. If too small, it is unfavourable to beauty; but what is worse, it is inconvenient for the well placing the bridle. A wide open nostril is not only requisite to form beauty in the lower part of the head, but it is certainly conducive to free respiration or good wind.

OF THE TEETH, AS CHARACTERISING THE AGE; WITH THE AUXILIARY MARKS.

As it is necessary to obtain some marks whereby we can ascertain the *age* of the horse, the ingenuity of man has employed itself in noticing those changes in the organs which are most readily observed, and the least liable to variation. The teeth, as a part of the bony structure (which, being the base of the whole, and known to be little liable to accidental mutation), have been happily seized on for this purpose*. We shall here consider the teeth as numeral indices of age only; reserving a more general sketch of their anatomy and physiology, as manducatory organs, for a future opportunity. It is well known that the usual indications of the age of the horse among us are derived from certain *marks* in the incisor teeth, and principally from those of the lower or posterior jaw. These *marks* consist in a *funnel-like cavity* in each of these teeth; each is also covered over with an intensely hard coating of enamel. As this coating of the tooth reaches its nipping edge, it passes over the plane surface, and then dips down to line the *funnel-like cavity* in its centre. This central hollow thus formed, and thus lined, becomes dark within by incrustation; and therefore, as long as this oval cavity remains, so long a striking *mark* continues: but when, by constant attrition, the cavity has been worn away, such horse is said to have '*lost his mark*.' In organs less durably formed than the teeth of the horse, the degrees of attrition to which they are liable being different, would vary their deterioration, or wearing out of this *mark* also. But their qualities being such, that they are not materially affected by variations in food, &c., their wear is found to be nearly uniform, by which they present one general indication in all horses, by the regularity of the periods at which these *marks* disappear. To a further explanation of the other appearances, which these surfaces of the teeth present, it is necessary to state, that the apex of the angle formed by the doubling of the enamel over the edge of the tooth, one limb of which embraces its surface, while the other enters the cavity, becoming abraded through its surface, leaves two distinct layers or portions; one which lines the cavity, and one which bounds the exterior surface of the tooth, the common bony or rather horny matter of the tooth being interposed between them. This latter substance being softer than the enamel, wears away faster, and thus leaves two ridges on the nipping surface, one of which surrounds the central cavity [see *plate* 2], and the other embraces the outer surface, but both serve to raise prominences for the double purpose of cropping the food and holding it between the teeth when necessary; by which also the teeth become a more terrible weapon of offence.

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* 'The knowledge of the age of the horse by an examination of his teeth goes back to a very remote period, since the ancient writers speak of it as of a thing known long before them even. Both the Greeks and the Romans knew perfectly well that the horse's teeth were forty in number, and the mare's thirty-six; that the incisors were temporary, and replaced by others from thirty months to five years old; that the tushes or angular teeth appear between the ages of four and five; that at eight years old the mark is obliterated in all the incisors, that is to say, the horse has lost his marks. The ancients had also remarked some of the changes that the teeth undergo after eight years old.'—*Ganley's Translation of Girard on the Teeth*, p. 8.

The horse, as is well known, has two sets of nipping and grinding teeth, a *temporary* and a *permanent* set. In the outset we shall treat only of what are called the nippers among horsemen, and incisors by naturalists. About a week or ten days after birth, the foal puts out two *front nippers* above and below, which seem to fill up almost the whole of the alveolary border. The little jaw enlarges, however, so rapidly, that about the fourth or fifth week the *middle nippers* also find room to appear, and, with this complement of *temporary* or *milk teeth*, this sportive and interesting animal frolics around, until towards his sixth month, when he becomes furnished with two *corner* nippers above and below. In very forward colts, the dentition partakes also of the early evolution, and thus these corner nippers, known among breeders as the *shell teeth*, will sometimes appear as early as the fifth month; but in cold situations, with a spare supply of generous milk, they are occasionally kept back until two or even three months later. The animal has now its full '*colt's mouth*' or nippers; and the completion of the process occurs most opportunely at a time when its wants, from increased growth, become greater, and its maternal supplies less, the milk of the mare beginning about this time to decrease.

This *early* or *temporary set* of nippers, as might be expected, differ from the permanent or horse teeth by being altogether smaller and whiter, and also by having a well-marked neck to each, which ends in a more pointed and slender fang; neither have they grooves or furrows on their outer surfaces. They are slightly rounded in front, and hollowed towards the mouth (see fig. of Colt's Teeth, *plate* 2): the cutting surface of each of these also rises into a sharp edge in front, which fits it for tearing up the grass; the outer edge slants over the inner, and affords another point of contact likewise. But these early teeth being less durably framed than those which are to follow, soon shew the marks of even the early attrition they meet with. Before twelve months the marks in the front nippers are *worn down*, or filled up, as it is frequently called*. The *middle nippers* lose their mark soon after the first; and by two years the cavity is nearly obliterated in all of them, and they appear not unlike the horse nippers at eight years old (see figures of 2, 3, and 4 years' old Teeth, in *plate* 2).

The *molares*, or *grinders*, although they do not yield such definite characters of the age, may be usefully employed as auxiliaries. The foal is usually born with a certain number of grinders already protruded above and below. Two always appear together, but we believe the third is not so frequently synchronous with the two former, but usually is put out about a week or two later. At a period varying between eleven and fourteen months a fourth grinder is added, which is one of the permanents, and constitutes the fourth of the horse row. It may, therefore, be considered, that a full yearling colt or filly will have six nippers and four grinders on each side, above and below. The front nippers being nearly level on their *marked* surfaces, and the others shewing the effects of wear also; but the middle much more than the corners (see *figure of* 1-*year Colt's Teeth*). The fourth grinder will display itself conspicuously likewise by its increase of surface, and its prominent rugæ, but unequally developed. Before the completion of the second year, the second permanent grinder is added, and forms the fifth of the row. Between the second and third years, the first milk grinder falls out, and is replaced by the first of the row of the permanent grinders; and between the third and fourth year, the second temporary grinder gives place to the second permanent one, as in the following year; the third and last of these milk teeth is succeeded by the sixth permanent molar, which completes the grinding set.

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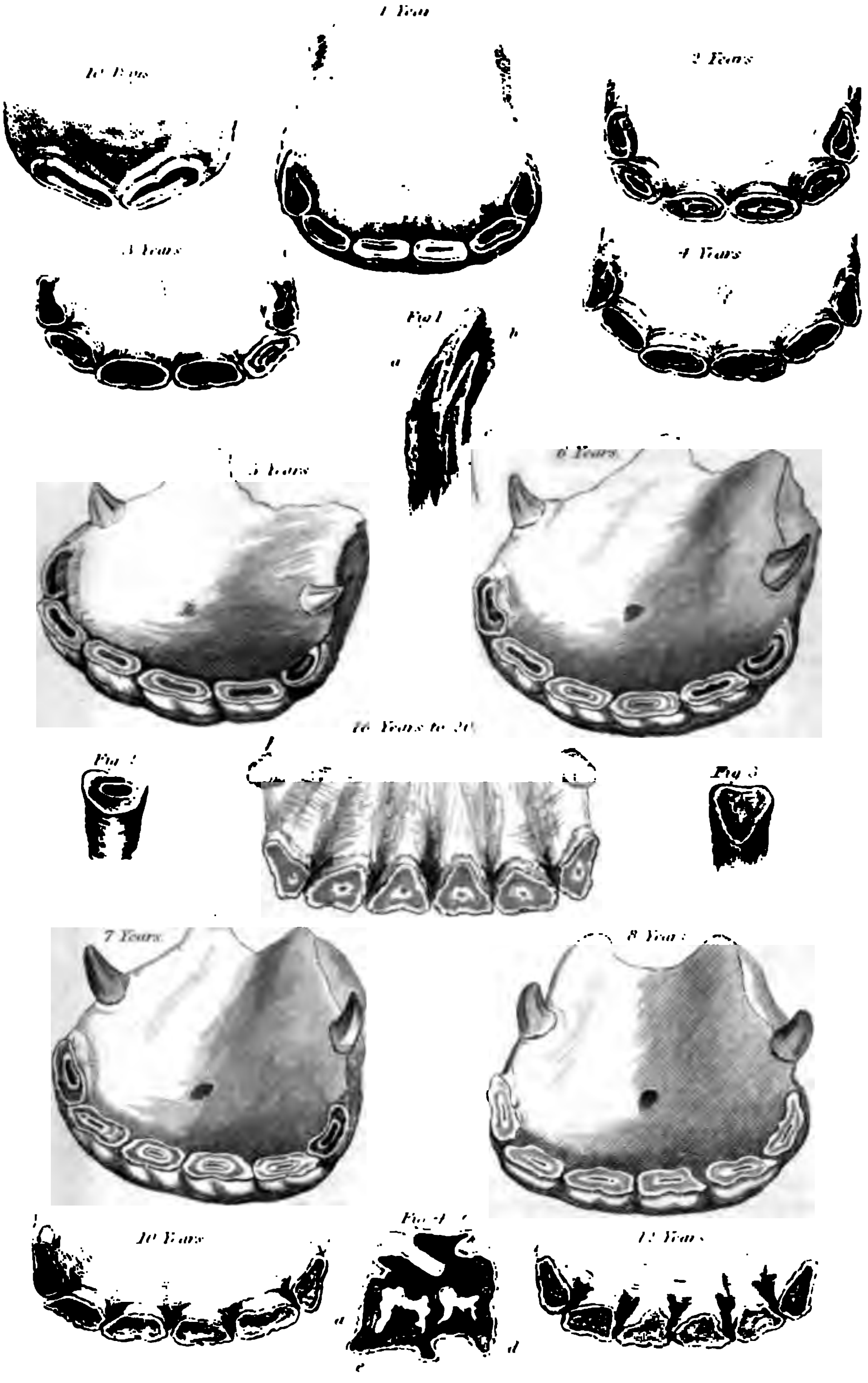
* The *mark*, however, can hardly be said to be *filled up*, although we have ourselves heretofore used the term. The central enamel by attrition wears away, and lessens the cavity; although it does not apparently diminish the volume of the tooth, for that extends itself upwards to meet the wear of its surface: but as the depth of the cavity is definite, while the growth of the body which contains it is indefinite; so the hollow must be subjected to complete obliteration, although the tooth remains of equal length. It, therefore, *wears out*, but never *fills up*. (See Teeth, in the *Osteology.*)

To pursue our dental characters of the age, we must now take up the permanent or horse nippers, and which are those most important to the purposes of the breeder, the seller, and the buyer. We must first observe, that, although constitutional peculiarities will occasionally interfere with uniform dentition, and although the evolution of the teeth may be hastened or retarded by an early or a late foaling, yet, by common consent among us, May is presumed to be the birth-month of every horse; and notwithstanding these circumstances, this understanding answers all the usual purposes of commerce. Far otherwise is it with the veterinarian, who must look much closer, as on his judgment very weighty decisions will often depend.

The appearance of the permanent set of nippers may, in brevity, be thus stated:—The *front*, at from two years and a half to three years. The *middle*, or as sometimes called *dividers*, from three and a half to four years. The *corners* from four and a half to five years; during which period the tushes or tusks in the horse also protrude. The colt now drops his name, and assumes that of a horse; the filly is also transformed into a mare: both are now adults, and are, without hesitation, applied to the purposes intended for them.

The horse's *tusks*, *tushes*, or *canine teeth*, are four, two in each jaw. When the first is at its full growth (which is about an inch long in its free portion, and takes place about the sixth year), it assumes a slightly incurved cone-like form, having internally furrows (see fig. of 6-year old Teeth, *plate* 2); which arising from the base, extend upwards and meet, leaving a triangular eminence between. The tush is not unfrequently examined as a criterion of the age; and some persons place much dependence on the presence or absence of its point, and the degree of its curvature, as well as the distinctness of its furrows: and although these appearances are liable to variation, yet the veterinarian would do well to accustom himself to a frequent examination of the tushes, as it occasionally happens that he can only take a very hasty glance at the mouth of some impatients; but there are few that will not allow the finger to be passed between the lips. In the evening also, or in very dark stables, the tush will often afford a useful, though not a positive indication. By *seven* years old, the pointed extremity of the tushes becomes somewhat blunted (see *plate* 2); the inner ridges lose their prominence, and the whole tooth seems approaching a bulbous form.

At *eight* (see *plate* 2), these appearances are yet stronger, until, in some instances, by twelve or fourteen years old, the tusk presents little more than a button-like knob, the upper wearing faster than the lower. The French,


10 Days
1 Year
2 Years
3 Years
4 Years
Fig 1
a
b
c
5 Years
6 Years
16 Years to 20
Fig 2
Fig 3
7 Years
8 Years
10 Years
Fig 4
a
c
d
12 Years

however, place so little dependence on their indications of age yielded by the alterations in these teeth, that they are hardly mentioned as marks by many of their writers.

Making, therefore, the nippers our principal guides, we proceed to remark that, during the period between the fifth and sixth years, the cavity in the front nippers wears away; and thus a horse is said to have lost his mark at *six*. The close observer will, however, yet be able to discover a central discoloured depression, and a prominent ridge of enamel around it, with an intervening part occupied by what has been already called the horn of the tooth.

At *seven*, similar appearances have taken place in the middle nippers, which have now lost their mark also.

At *eight*, the mark, or rather the cavity, is obliterated from the corner teeth likewise, and in jockey language the horse is now *aged*. (See these several periods figured in *plate* 2.)

It was usual with the horsemen of this country to pursue the criteria of age by means of the teeth no further than eight years; but the French, who have preceded us in most matters connected with veterinary science, pretend to be able to judge correctly by subsequent alterations in the form of the body of the teeth much beyond this period; and if a critical judgment be not thus gained, yet it is well worthy of attention. It must also be noticed, that the structure of the upper nippers is not altogether the same with those of the lower; for their central cavity being deeper, takes longer to efface, and thus yields a longer indication of age. M. St. Bel, our earliest college professor, was the first who taught among us, that the cavities in the upper incisor teeth had a gradual and equal wearing of two years between the several varieties of these nippers: thus, that at ten the front nippers, at twelve the middle, and at fourteen the corners, presented plane surfaces, and had lost their *mark*. But these periods of obliteration of the dental funnel or *mark* of the upper nippers are not acknowledged by all continental writers: on the contrary, some of the most eminent, instead of two years as the periods of planing between these several teeth, give one only. It is under this view Mr. Percivall observes, that he also examines them as marking the age from the ninth to the twelfth year; and he informs us, that he finds his opinion confirmed by observations. We were ourselves formerly much more disposed to place reliance on these prolonged criteria of M. St. Bel than at present; it is unquestionable, however, that the markings of the anterior nippers are seldom worn out by the twelfth year.

The successive changes wrought on the general substance, and the general form of the lower or posterior nippers, after the *central* enamel has disappeared, have also been noted as characteristic of the age to a very prolonged period. Lafosse many years ago described indications of age to be gained by examining the figure of the nipping surface of the lower incisors long after it has become plane. M. Pessina, Professor and Director of the Veterinary Institution at Vienna, has carried a similar examination to an extraordinary length, and his descriptions are given with much minuteness of detail. 'He explains the gradations of years, beyond the age of eight, uniformly by the shapes that the incisors assume in consequence of their wear: he has distinguished four successive periods; the oval, the round, the triangular, and the biangular. After the disappearance of the central enamel the table presents a coloured point, that appears before the wear of the funnel is completed, and takes different shades and different shapes: it is not even uncommon that, in very old teeth, this root gives place to a small black cavity (i. e. the cavity in the root of the tooth, *c, fig.* 1, *plate* 2). In studying well all that these marks present remarkable, produced by the funnel and its root, in noticing exactly the appearance and duration of each of these changes that it undergoes, *we may distinguish old subjects by principles nearly as certain as those founded on their first appearance, and the obliteration of the mark in them.*'

According to Mr. Ganley's translation of M. Girard, that author's views on this subject are as follow: 'At eight years old, there is usually complete obliteration of the mark in the lower jaw, the nippers, the dividers, and the corner teeth; the central enamel is triangular, and nearer the posterior than the anterior edge of the tooth; the termination of the cavity next the root appears near the anterior edge in the form of a yellowish band, longish from one side to the other. At nine years old, the nippers become rounded, the dividers oval, and the corner teeth have become narrow; the central diminishes, and approaches the posterior edge. At ten years old, the dividers are become rounded; the central enamel is very near the posterior edge, and rounded. At eleven years old, the dividers have become rounded; the central enamel is hardly any longer apparent in the teeth of the lower jaw. At twelve years old, the corner teeth are rounded; the central enamel has completely disappeared; the yellowish band is of more extent, and occupies the centre of the wearing surface; the central enamel remains in the teeth of the upper jaw. At thirteen years old, all the lower incisor teeth are rounded; the sides of the nippers are becoming longish; the central enamel remains in the teeth of the upper jaw, but it is round, and approaching to the posterior edge. At fourteen years old, the lower nippers have an appearance of becoming triangular; the dividers are becoming long at the sides; the central enamel of the upper teeth diminishes, but still remains. At fifteen years old, the nippers are triangular, the dividers beginning to become so; the central enamel of the teeth of the upper jaw has not disappeared as yet. At sixteen years of age, the dividers are triangular, the corner teeth beginning to become so; the central enamel of the teeth of the upper jaw will, in many instances, be found to have disappeared. At seventeen years of age, all the teeth of the lower jaw have become completely triangular; but, as we have before seen, the sides of the triangles are all of a length. At eighteen years of age, the lateral portions of the triangle lengthen in succession, first the nippers, then the dividers, and afterwards the corner teeth; so that, at nineteen years of age, the lower nippers are flatted from one side to the other. At twenty years of age, the dividers are of the same shape. Finally, at twenty-one years of age, this shape appears in the corner teeth also.'

We give this as the substance of the opinion not only of M. Girard, but of the veterinary professors of the French school generally; and if the various alterations in these organs, in the lapse of a long period, should be diverted from their regular channel, and thus not offer all the certainty of indication we wish, yet the veterinarian may receive great help from them: they may serve to found an opinion upon, and, with collateral circumstances, may swell suspicion into certainty. It must, however, never be lost sight of, that the descriptions which have been given of dentition throughout are best understood, and, indeed, can only be justly apprehended, by considering that it is not by simple wearing away of the upper surface, and consequent decrease of the column of the tooth altogether, that the *indicatory* changes in their appearances take place, particularly in the protracted periods of life, but by a disposition in the teeth to shoot upwards to meet the continual deterioration going on; *by which a gradual exposure of their under surfaces is made far below the original depth of the central cavity producing the mark.* It must, also, not be forgotten, that as, on a view of the figure of a tooth throughout its whole extent, the alveolary will be found to vary much from the free portion, so it is readily explained why the figures of these senile teeth are so unlike those of more early periods. It must likewise be taken into account, that, during the whole of a long life, a principle of condensation is going on; walls approximate to strengthen the decaying mass, and much is absorbed to be deposited in other situations. Still, however, the results of this springing up from below are so in unison with the appearances of the old teeth, figured in *plate* 2, that a good physiologist, *à priori*, might have formed a similar sketch: and that these appearances being dependent on organs originally framed after one pattern, give us much dependence on their justness, and convince us of the propriety of the French authors in setting a considerable value on them.

It will also strike the reflecting mind, that this study of later characters will become even more important, as our yielding to vulgar prejudices, and to old but erroneous impressions of *age* as it stands in the horseman's vocabulary, give place to conviction from reason, analogy, and experience: that what the jockey calls age, as connected with the natural powers and duration of the animal, is antedated by at least another eight years.

To those, therefore, who are simply interested in horses on the score of their utility, and are not called on to certify the exact age for transfer or barter, a dependence on the usual indications of age drawn from the teeth is little necessary. Impressed with a conviction resulting from experience, that what is called *age* in the mouth is often combined with *youth* in the limbs, the practical judge, instead of refusing such an offer when it occurs, hails it as a boon; for the reputed age has produced only the best effects, by condensing the solid parts of the frame, and rendering them capable of continued exertion; such age is also usually accompanied by a steadiness of temper and disposition that teaches him to employ his powers judiciously.

The *exterior indications of approaching age* are not equivocal; they are often very striking, always interesting, and sometimes picturesque in the extreme. It is not too much to say, that the points of a horse, as all those external characters on which his qualifications depend, never shew themselves until he is *nominally* unfit to look at. Regard the well marked head of the horse at ten or twelve—how angular! His fine eyes, divested of much cellular matter, now stands out without a foil; his thin and thinly clad crest carries itself into withers which seem to rise to receive it. His circular carcass, trussed up by exercise, unites with hind quarters, square and muscular, supported on limbs equally well furnished. Would you refuse such a one because he had lost a mark from his teeth, when he had gained so many superior marks all over?

The truly *senile horse* will be seen with eyes sunken, sometimes dim, and eyepits hollow; the lips will be thin and pendulous, the under or posterior often extremely so. The anus, not wedged up by interstitial matter as heretofore, and not sufficiently retracted by its muscles, projects much. The grey horse becomes white, and the darker colours become intermixed with grey, particularly about the head. The bony processes in every part of the body stare out, and give a rigidity of appearance which well accords with the actual state of the body. So much greater is the absorption of parts now than their increase, that even the diseased deposits of more youthful times, as windgalls and bony exostoses, are lessened or disappear altogether*. The mouth also will present some appearances beyond those noted by the French accounts. The incisor teeth assume a more horizontal direction, and project forward; and the upper corner one is frequently sawed, as it were, into two parts by the action of the lower, which in turn loses its outer edge also in the wear. The whole of them become yellow, are covered with tartar, and stand wide apart from condensation and approximation to their roots.

The cautious veterinarian, when called on to give a professional opinion, must however form his judgment principally on the appearances afforded by the teeth. Under this view, it is imperatively necessary for him to take into his account all such circumstances as are likely to mislead the judgment: the principal of these are, the irregularities of dentition, and the arts of breeders, dealers, &c. Although, as already observed, the age of all horses is dated from the 1st of May, yet we know that they are occasionally dropped in December even, and we have seen others which were said to be foaled in July. These differences must, of course, influence the dentition much, and an early foal will thus have what is called a *forward mouth;* and when such a one is either reared by an expert breeder, or falls into the hands of a professed jockey, he takes care to make this circumstance turn to account, by converting these few months of difference into a year. Neither is the time of birth the only means of early or protracted dentition. Warm sheltered situations, with a liberal supply of generous milk, and a pasturage so luxuriant as to allow early browsing in the foal, will hasten the evolution of the teeth, as the absence of these will retard it. In some instances, constitutional anomalies present themselves: the middle and corner nippers have been delayed two, three, and even four months beyond the usual time; in which, and similar cases, the judgment can only be directed by an inspection of the grinders, which seldom participate in the irregularity.

The front nippers usually fall at two years old; and the veterinarian, in examining a colt in May, which had been foaled the previous December or January twelvemonths, and finding that the subject of his examination had already two permanent nippers in front tolerably well up, without examining further, might state the age as rising three, instead of two; which would be the real age in horse reckoning. Such a circumstance would be particularly likely to occur, if the colt happened to belong to a professed breeder; for he, seeing the forward state of the animal, would in all probability, the October or November preceding, have extracted the colt front nippers, which would hasten the appearance of the horse or permanent pair. It is evident, however, that a closer examination would detect this; for if the colt were really three years old, the age the breeder intended to make him appear, the middle nippers would have nearly lost their mark, and that in the corner would also shew the effects of wear; but neither of which appearances could, in the present instance, occur. Further examination into the mouth, in such case, will likewise shew, that although the colt or filly has already five grinders, yet that the first of them are of the milk set, and the two posterior only belong to the permanent or horse set, and which latter are readily known from each other by the difference of their size and markings. But, on the contrary, had the colt really reached his third year, then the first grinder would be one of the horse set, and it would be evidently but newly put out likewise.

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* Splents are often wholly absorbed, and ring-bones become very much lessened; but bone-spavin seldom alters to any considerable degree: neither do the exostoses which unite and encrust the dorsal processes ever become absorbed; and thus the stiffness in the back, so common in old horses, always increases with age.

These frauds, therefore, can only pass current in general cases on the inexperienced, and where the animal, by its being the produce of a very early foaling, may have actually attained marks of majority in its general appearance also; when, indeed, it really may require the discriminating eye of one very well versed in all the dental characteristics to decide. Another fraud much more common than this is that of passing off a four-year old for one of five years, particularly where the colt is a promising and somewhat early one. This is done by punching out the corner nippers, by which the horse corner nippers will appear sufficiently early to make an early four-year old pass for a late five-year old. To assist the deception, also, the gums opposed to the tushes are frequently lanced, which is supposed to bring them forward. From what has been so circumstantially stated with regard to the true appearances of the teeth generally, from year to year, the veterinarian will, however, as readily detect this fraud as the former: which will farther shew itself in the horse-form of the body being so little developed in the four-year old, who, in the horseman's language, is *raw* both in figure and manner. The four-year old colt is but little *furnished*, his forehand is thick and low, his feet round and expanded at the bottom, his legs long, his muzzle round; neither has his mouth the depth usual in the five-year old horse.

The deceptions practised on the teeth do not stop here, but pursue the horse much later: thus, when a dealer becomes possessed of a horse whose teeth bear more actual marks of age than either his limbs or spirit, it is an object worthy his attention to give such teeth a more youthful appearance. The principal part of this art consists in the operation called *bishopping* (as supposed from a man of that name, one of its earliest or most expert practitioners), which consists in the making an artificial cavity in the upper surface of the nippers, by means of a sharp hard tool, and rendering the cavity permanently black with a heated pointed instrument: but the strokes of the graver detect the imposition, and the two inner grooves of the tushes cannot be restored by similar means; nor can its blunt point be again made sharp and prominent.

The judgment formed from the teeth, though generally to be depended on when these frauds have not been practised, is yet liable to some error from other causes than these. Some horses living wholly on grain, and very early worked, will occasionally be found to have gained on others which have fed principally on succulent matter. In cribbiters, and those which champ much on the bit, this variation may be very considerable, and make a full year's difference between them and others. It remains again to remark, that a too strict adherence to the teeth-marks very frequently leads those who are only moderate judges into very great error in another way; which is, that of frequently causing them to reject the most useful and valuable horses without these marks, as being supposed past their work. Nothing is more fallacious than this: the commonly received indices of the age grant a criterion of not a third of the natural life of the animal; nor of one half of the time in which he is perfectly useful, and fully capable of answering all the purposes for which he was intended: and it is only in a country like our own, where these generous animals are so early put to labour, and so unremittingly forced to pursue it, that this mark is so much attended to. A subordinate attention only should be paid to the appearance of the teeth, if a horse appear what is termed fresh and sound; that is, if all his organs be capable of their several functions, the limbs being firm, and exhibiting no appearance of too early, too great, or too long continued exertion. The early ruin of English horses is not only to be attributed to the excellence of the roads and the calls of business, which urge our horses onward, but it is equally to be laid to the account of their being too soon worked, before the maturity of the system is perfect, or the motive organs completely evolved. The premature exertion forces nature into artificial means of strengthening the debilitated organs; hence the cavities between the tendons and their sheaths are destroyed; parts take on a bony structure, whose original formation was cartilaginous, as the lateral cartilages of the feet, and the articular processes of the vertebræ; a greater quantity of ossific matter is deposited on the surface of some bones than is natural, forming splints, spavins, ringbones, &c.: and to counteract the unnatural waste, other secretions are likewise preternaturally augmented, producing, in the mucous capsules windgalls, and blood-spavins in the obstructed veins, &c. But where horses are suffered to attain their full growth, and the complete evolution of their stamina, if they are afterwards put to full exercise, not altogether inordinate, they become competent to the exertions expected of them, and reach old age sound and vigorous. Many good judges will not purchase a horse for hunting earlier than eight years old, and regard him only in his prime at ten or twelve. It is too little considered, that the period of a horse's life, with moderate care and good usage, is protracted to twenty-five, thirty-five, and forty-five years; and an instance lately occurred of a horse dying at fifty. The accounts of their being vigorous and strong at thirty, and thirty-five, are very numerous; and nearly as frequent as activity in men of eighty and ninety. A gentleman at Dulwich, near London, has three monuments of three horses, who severally died in his possession at the ages of thirty-five, thirty-seven, and thirty-nine. The oldest, it is to be remarked, was in a carriage the very day he died, strong and vigorous; but was carried off in a few hours by spasmodic colic, to which he was subject. At Chesham, in Buckinghamshire, there was a horse of thirty-six years old, who exhibited no symptoms of debility, nor any external signs of age, but by being nearly covered with warts. It was remarkable, with regard to this four-footed Nestor, that when an unusual hard day's work was required, he was always chosen, as never failing in what was expected from him. A horse named Wonder, belonging to the riding-school at Woolwich, may be quoted as living to forty years.

Mr. Culley, in his *Observations on Live Stock*, mentions a horse he knew, which lived to the age of forty-seven years, having during that time a ball in his neck, received in the battle of Preston, in the rebellion of 1715, and which was extracted at his death, which happened in 1758: and, judging him at four years at the time he received the wound (and it is probable he was more), he must, at his death, have been forty-seven. But even these venerables were mere babies to the barge-horse of the Mersey and Irwell Navigation, who was well known to have been in his sixty-second year when he died.

It is true, that these are not very common instances; yet it is not the natural economy of the animal which makes them so, but his early application to full exertion, and the unremitting continuance of it, whereby his race is begun frequently before he is three, in the break, lunge, or riding-house; before five, his utmost speed is exerted after the hounds in winter, and as a hackney against time in the summer; at seven, blind, foundered, and spavined, he gallantly shines in the mail or stage; at eight, he falters in the fish cart; and, before ten, worn out with disease and inanition, his reputed old age gains him an honourable exit at the slaughter-house.

Hence it must be at once evident how small a proportion of a horse's *natural* life is eight years; and yet this past, the majority of persons begin to consider him as aged, and unfit for service. The more we see and observe of horses, the more we shall be astonished at the want of attention and consideration this evinces. A long acquaintance with these animals has induced me to draw the following comparisons between their ages and that of man; that is, at these several periods of comparison, the constitution of horses and man may be considered as in an equal degree of perfection and capability for exertion, or of debility and decay, according as youth or age preponderate. Thus, the first five years of a horse may be considered as equivalent to the first twenty years of a man; or thus, that a horse of five years may be comparatively considered as old as a man of twenty; a horse of ten years, as a man of forty; a horse of fifteen, as a man of fifty; a horse of twenty, as a man of sixty; of twenty-five, as a man of seventy; of thirty, as a man of eighty; and of thirty-five, as a man of ninety. So far from this comparison being too much in favour of the horse, I am disposed to think it too little. Horses of thirty-five years of age are as common as men of ninety, provided it be taken into the account that there are twenty human subjects for every horse; and, unquestionably, a horse of forty-five is less rare than a man of a hundred and ten.

Of the Age of Horned Cattle.

In the *ox* and *sheep*, the age is most frequently judged of by the horns, as offering a more convenient point of observation than the teeth. But as the horns are the subject of much trickery, and as some breeds of both are now hornless, it is important that we should be justly informed of the indications of age by them. The dentition of horned cattle has been more neglected than that of the horse; and the scientific breeders, who have learned to mould the form of these animals at their will, have failed to inform themselves on so simple a matter as the successional changes in the bovine teeth: on the contrary, they have copied each other's errors from Buffon downward; until, in the present day, some of our highest authorities are not within twelve months of the correct periods of the displacement of the one set and the appearance of the other. Mr. Boardman, V.S., informs us, that the permanent incisors begin to take place of the milk set at ten months, and that by three years they are all renewed. Mr. Parkinson erroneously states, that cattle are *full-mouthed* at four years old; while Culley and Dickson, better informed, have justly stated the period of the full-mouth to be five years. Mr. Youatt, who has entered more into detail on it than any previous writer among us, observes, that a *calf*, either at birth, or very soon after, is found to have two middle incisors in the lower or posterior jaw; neat cattle having, as is well known, none above. In a fortnight, two others appear alongside of the first. The third week usually produces two more; and by the fourth or fifth week from birth, the addition of two others makes the complement of milk incisors (eight) complete. 'These teeth,' says Mr. Youatt, 'will present a surface convex externally, and somewhat concave within; the portion above the gum will be covered with enamel, and which will slant upward from the internal to the external surface of the tooth, forming an edge of considerable sharpness. The only indication of advancing age will be the wearing down of these sharp edges, and the appearance of the bony substance of the tooth beneath. Even at a month the centre teeth are a little worn. At two months the enamel will have been somewhat worn off the edge of the four centre teeth. At three months, from the six centre; and at four months, the corner teeth will likewise be considerably worn.' From this period these teeth decrease in size in the order of their appearance, until two years old, when the two middle ones are pushed out by those of the permanent set; and thus a two-year old steer or heifer will have two large middle incisors pushing up, and six dwindled ones remaining. At three years old there are four of the old and four of the new set; but the older will be seen to be almost hidden by the others. When the beast is four years old, there will be found six permanent broad incisors, and two shrunken ones of the milk set, which latter sometimes do not displace themselves so readily, but, on the contrary, form a species of wolves-teeth, and annoy the animal much, unless they are extracted. It is at five years old that the animal may be said to be full-mouthed; for at this period, whether it be steer or heifer, the eight incisors will be all up, though they will not appear equally grown until six years old. 'After this period the edges of the incisor teeth rapidly wear down. Even at three years, the edge of the central incisors is taken off. At four years, a dark waving line, shewing the bone beneath, begins to appear. At five, it is seen in the four central ones; and at six it has extended over the whole set. At seven it is becoming broader and more irregular in them all, exhibiting a second wider and more circular mark within the former one, which, at eight, has extended over the six middle teeth. At nine, the process of diminution which was observed in the milk teeth is beginning to appear in the permanent ones, and the two central teeth are evidently smaller than their neighbours; and the two dark marks in all except the corner teeth are ground into one of a triangular shape. At ten, the four central incisors are diminished, and the mark is becoming smaller and fainter. At eleven, it is so with the six central ones; and at twelve, all are much diminished, but not to the extent to which the diminution of the milk teeth was carried; and therefore these teeth are much closer together than the milk teeth of the eighteen month steer were. The mark is now very faint, or nearly obliterated, except in the corner teeth, and the inner edge is worn down to the gum.'—*Veterinarian*, No. 28.

The *horns* of cattle also yield indications of age thus:—At three years the temporaneous set falls, and by the fourth, two small horns, terminating in a button-like extremity, appear. The growth of the horn impels this button forward, and another horny cylinder, similarly terminated, appears annually as long as the animal lives. The horny accretion converts these bulbous extremities into annular joints or horny rings; and thus, by allowing three years for the point of the horn, and an additional year for each ring, the age is obtained. To frustrate this judgment, it is not uncommon to shave or rasp the horns: but the mouth, by the foregoing rules, will yield a just indication.

In *sheep*, also, the age is judged of by the teeth and horns. The second dentition commences between the first and second year, but by the second year, the middle permanent incisors of the under or posterior jaw (for they also have none above) are up. At three years they have four of these *broad teeth*, as they are called; at four, six of them are fully evolved; and at five years, the two others are up, which makes them *full-mouthed.* The sheep teeth, as the animal advances in years, becoming divested of its enamel, blacken, shrink in volume, and, where circumstances occasion these animals to be allowed to become very old, they loosen, and prove almost useless. The teeth of goats follow similar laws, and their age is indicated by the same appearances.

The *horns* of sheep and of goats are not changed, but appear the first year; and as they also gain a horny ring every year, so, by adding one year for the end and one for each ring, the age is indicated in the horned breeds.

EXTERIOR CONFORMATION OF THE HORSE.

[Continued from p. 26.]

The *channel*, among horsemen, is the hollow that is formed between the two branches of the posterior jaw; internally it lodges the tongue; more exteriorly are placed glands, vessels, and fat. It should not be too wide, or the head will appear clumsy; but on the contrary, if it be too narrow, it becomes a still greater defect, both in the riding and the carriage horse; for in this case it will prove painful for the horse to bend his head inwards, or to rein in to the bridle, either in riding or driving.

The *neck* should form from the head to the withers an elegant but moderate curve, with which it should unite with a very moderate depression only; while its under surface ought to be but very slightly incurvated, and should enter the chest rather above the point of the shoulders. In point of length, it is of consequence that the neck be duly proportioned: a long neck, when thin withal, seldom presents a firm or proper resistance against the pressure of the bit. When, on the contrary, the neck is too short, the head is frequently ill placed, and the lever in the hand of the rider will be also too short. Such necks are often likewise weighty, and overloaded with flesh. It is evident, also, that such cannot be reined up without danger of suffocation; and it is seldom that a short-necked horse is speedy. When the upper surface of the neck is thick and heavy, it is a very strong presumption of a sluggish disposition, particularly in geldings and mares. In stallions it is a *distinctive sexual* mark, and hence less to be depended on. Now and then the neck is arched downwards, which is called ewe-necked. When the deformity is considerable, it prevents the head from being carried in its true angle; instead of which, the nose, from being projected upwards and forwards, has occasioned such horses to be called star-gazers; to remedy which, it is usual to draw down the head by a martingale. In the horse, as well as in all the grazing tribes, the length of the well-proportioned neck is such that, added to the angle resulting from the head, the length of both is equal to the height of the shoulders from the ground. It may not be amiss to mention, that, in the purchase of a horse, it is prudent to observe whether the upper part of the neck bears any marks of a tight collar having been worn: when such an appearance does exist, it commonly arises either from a strap worn to prevent the action of cribbiting, or such a horse is apt to unloose himself, which is almost an equal defect. A large prominent windpipe is considered desirable.

The *mane* crowns the neck throughout its whole extent: in front of the head it is called the foretop. Nature appears to have designed this part simply for beauty to the animal: had it been for a guard to the neck, it would have grown on both sides; whereas, when not altered by art, as in dragoon horses, it hangs naturally to one only. In stallions, the mane is generally thick and long: a white one, exhibited some years ago, was several feet long, and was carried in a bag. It is usual, when it is wished to thin the mane and tail, to wrap a tuft of the hair around the fingers, and pull it out by the roots; but this mode prevents its laying well, and disposes some horses to resist. In my own stable, I have found that the frequent use of a three-pronged angular iron was the best means of keeping the hair thin, and assisting it to lay well. See *Veterinary Instruments*, at the end.

THE BODY AND LIMBS.

In proceeding to a description of the external conformation of the trunk and members of the horse, are we to consider the matter philosophically, and regard him as the type of an important genus? or are we to examine his frame and organology with a view to his application to some one of the numerous purposes to which mankind apply him? It is in this latter way that the purchaser of a horse would most likely proceed; but it is by general principles that the teacher can best accomplish his purpose, being well aware that it is by an extended view of the whole that the individual purposes can be best exemplified in the *summary*. Whatever may be the services required of the horse, strength, action, and safety, are indispensables: the degrees of these qualities may relatively vary, according to the work he is employed in, but each of them is, in every instance, a requisite. *Power* is the result of muscular contractions acting on organs adapted for motion. *Action*, in its degrees, as operating locomotion of the machine, depends principally on the length and direction of the various parts of the bony fabric as opposed to each other. The *safety* of the action, generally, is connected with the degree of perfection in the form and direction of the limbs, united with a just proportion of their lengths.

The *withers* are formed from the long spinous processes of the dorsal vertebræ; and as, when operated on by the powerful lumbar muscles, they act as levers in elevating the trunk, and with the trunk the fore parts generally, it is evident that any increase of their length is an addition to their power. It is thus that horses with *high* withers usually elevate their legs considerably in action, which is unquestionably favourable to the safety of their progression: this form is also considered as an agent in the quickness of progression; for, as we usually raise every body we wish to throw forward, so the elevation of the fore quarters allows the hinder (in which lie the great propelling power) to act to greater advantage, and thus elevating the fore parts accelerates the general motion of the whole. It is, however, evident, that to a just appreciation of the form of the withers we should consider the immediate services of the horse. In the hackney, the lightness of his carriage, the safety of his footing, and the readiness with which his saddle remains in its proper situation, render their height invaluable. To the hunter, in addition to the above, we may add the advantages which result from these lengthened levers in the action of leaping. The racer, on the contrary, is found to perform his wonderful exertions without any remarkable height in his withers: in Eclipse they were very low, and they are so in the majority of our racing fillies and mares. Reasoning on general principles, which seldom lead us into error, we should not, *à priori*, consider great height in these parts as essentials in the speed of the racer. The gallop of full speed is but a succession of leaps, and all animals remarkable for their rapidity in this motion are found low before and high behind; that is, they are furnished with long muscular hinder extremities exhibiting angular proportions acting on fore extremities, which are comparatively inert as to the propelling power. To the draught horse, low withers are peculiarly advantageous, and he can better apply his powers by approximating his fore quarters to the ground; for as all drawing is but throwing the weight of the body beyond its centre, which, requiring extraordinary exertions to counteract the tendency to fall, brings with it the load, so, the greater the weight the animal carries before, and the nearer he approximates this centre, the more advantageously he acts*. It is, however, to be observed, that what has been advanced with regard to this view of the withers, must not be understood to detract at all from the importance of the extent, just placing, and mechanical action of the shoulders; on which, as I shall attempt to shew, so much depends.

The *shoulders* extend obliquely forward, from a little below the withers to what are called among horsemen the points of the shoulders; but which point is formed by the articulation of the shoulder-blade with the true arm-bone, anatomically speaking (see *plate of skeleton*). The shoulders are apt to be confounded with the withers, which often leads to much error in justly appreciating the power and operation of the fore quarters. The withers may be high, at the same time that the shoulders may be narrow, straight, and altogether badly formed. The shoulders, to be perfect, should be muscular, but by no means heavy with extraneous cellular matter, for it is by the muscles of the shoulder that the action of the fore limbs is principally effected: it is, therefore, of much consequence that the muscular markings and prominences should be strong. Immense muscular power is also necessary for the suspension and connexion of these parts, as well as to operate their motion; the shoulders in the horse not being connected with the body by any bony articulation, but wholly by a muscular union. Large fleshy masses unite the broad expansive shoulder-blade by its upper and inner surface (see *a*, *l*, *k*, fig. 2, p. 6) to the chest, while other powerful muscles below suspend, as it were, the machine between them; by which admirable contrivance perfect elasticity is preserved. The uneasy seat we experience when riding on or near the croup of the horse, where the hinder limbs are connected with the body wholly by a bony union, will illustrate the difference between the elasticities of the one connexion and the other. When the body is propelled forward, its tendency to the centre of gravity is counteracted by the fore extremities, which then receive the mass: had the shoulders, therefore, been articulated like the thighs, the machine at every motion would have experienced a powerful and hurtful shock; but, formed as they are, the strong muscles of these parts receive and sustain what the hind quarters have thrown on them during progression. This connexion, it may likewise be observed, is not rendered strong by the power of these muscular masses alone, but also by the geometrical situation of the scapulæ or shoulder-blades themselves,

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* This is familiarly exemplified by the well-known fact, that when a horse in draught is laden a little beyond his powers, if a heavy man mount on his shoulders, the horse then moves his load with ease, by the increase of weight on his fore parts.

which being approximated above, form a kind of partial arch, receiving the trunk within the entrance of its arms: consequently the greater the force applied, either by gravitation or impulsion, the nearer will these segmental portions be approximated, and the more will their capability of supporting the weight thrown on them be increased.

The centres of action in the shoulders are within their common centre, and the extent of action of a part moving on its centre is in the ratio of its length. The motion the shoulder enjoys is confined by the nature of its articulation to the perpendicular backwards, and to as great an elevation as the muscles will admit of forwards; and these extensions being commonly uniform, it will be at once evident that the more oblique its situation, the greater number of degrees it will be able to run through: and further, when it is long and deep, as well as oblique, that this extent will be much increased. It is therefore easy to comprehend why breadth and length, but particularly obliquity of shoulders, are favourable to the safety of action by elevating the limb, to the elasticity of it by increasing the spring, and to the celerity of it by enlarging the angle. To the *safety* of progression this form of shoulder is peculiarly favourable; for as the angles formed between the shoulder, the arm, and the fore arm, are consentaneous, and make a kind of bony arch when in action, so an oblique and deep shoulder is generally accompanied with a full bending of the knee. The knee being thus elevated, is the occasion of a perpendicular replacement of the remainder of the column; whereas with a shoulder less elevated and more confined, the foot seldom sets itself on the ground flatly, but first reaches it with the toe, from which such horses are said to *dig* the ground, and are usually stumblers. Mares have very commonly low forehands, both as regards the height of their withers and the extent and obliquity of their shoulders: to counteract this, and to regulate the angles, an increased obliquity is very commonly observed in the whole limb downwards; and, as is familiarly expressed, they stand with their legs under them. This apparent defect is, however, given for wise purposes; for by such a position of their fore extremities the pelvis is raised higher, and the foal thereby becomes more conveniently placed, and less likely to be ejected. Few rules can be laid down for observance in the exterior conformation of the horse that are of so general application, as that a short and upright shoulder, particularly if united, as is usually the case, with an inclined direction of the whole limb backward, is a sure mark of an unsafe pacer, and commonly, though not so universally, of a slow one also. For it is to be considered, that much of the mechanism of motion depends on the muscular power being exerted in the ratio of the angular, and not of the vertical placing of the separate portions of the limbs it operates on. Thus, by a flexed position of the shoulder-blade in one direction, and of the true arm-bone in the other, both elasticity and speed are gained; while the true perpendicularity of the parts below, as the arm, usually so called, and the canon, give columnar support. The importance of a just form and position of the shoulders must, therefore, be apparent in progression, and more particularly in the walk and trot. The part between the points of the arms or shoulders is called the *breast* or counter; and our judgment of its form must be regulated by the variety in the animal. In the saddle horse, it should be only moderately wide and extended: when very confined, the lungs have not sufficient room for expansion, or otherwise they must press backwards and interfere with the stomach; and we do actually find that narrow-chested horses have seldom a good digestion, and consequently are seldom durable. The shoulders likewise in such cases are usually not sufficiently muscular, and the approximation of the limbs proves unfavourable to stability. On the contrary, when the breast is too wide, particularly when it projects and hangs over, the fore legs are apt to incline backwards: such a horse must be weighty, and consequently unsafe in his mode of going. This form, however, is peculiarly favourable to the draught horse, particularly for those employed to move heavy loads, for reasons lately stated.

The *elbow* of the horse, like that of man, is formed of the olecranon (*see skeleton*), but in the animal is applied to the chest; consequently the true arm of the horse, speaking comparatively with the human anatomy, is contained in the space between this point and the breast points. The elbow should by no means incline inwards, or it will confine the action, force the toe outwards, and sometimes occasion cutting. If it incline outward, which is less common, it is unsightly, and gives the toes an inward determination, and a rolling gait in the trot. It should, therefore, stand on a level with the arm laterally; and as its inclination backward is usually regulated by the degree of inclination of the scapula or shoulder-blade forward, so the more acute the angle between these parts the better, for the more advantageously will the muscles act. The length also of the process which forms the elbow, or, in other words, the greater extent there exists between the elbow and shoulder-points, the more will progression be benefitted; for as both of the bones constituting this part act as levers for the extensor muscles of the fore-arm, so the breadth and muscularity displayed between them are important considerations.

The *fore-arm*, usually called the arm of the horse, should be large, wide, and muscular; a small fore-arm is an indication of weakness. All animals intended for rapid progression have this part long likewise: the knee of the greyhound is but three or four inches from the ground; but though its length is favourable to speed, it is not found to add to the ease of the rider; and thus horses for cantering, or for the paces of the riding-school generally, are preferred with short fore-arms.

The *knee* of the horse corresponds with the human wrist. Like the joints generally, it should be large, by which the surface of muscular and ligamentous contact becomes increased, and the stability of the limb in proportion augmented: by this form also the tendinous insertions are further removed from the centre of motion, and thereby their power is increased. The knee should be carefully examined, to see whether the skin has been broken by falls; and great caution is necessary in this, for the hair sometimes grows so well over the scar as to leave it hardly discernible. Horse dealers likewise hide the blemish by blackening the part. It does not, however, follow that a mark or scar always indicates a stumbler; and persons are too apt to forget, that the safest horse may by an unavoidable accident fall; but which circumstance will never influence his future manner of going, unless the cicatrix should be of such extent as to interfere with the motion of the joint: if, therefore, the arm and fore-arm be strong, the fore-hand high, and the horse shew good action, he should not be rejected wholly for an accidental blemish.

The *canon* or *shank* follows the knee, and the perfection of its form throughout is important. As here are no fleshy masses, but purely tendinous matter, and as the bone itself is sufficiently solid, so it is not the circumference, but the breadth of the part, that is requisite to form a good shank. An attention to the osteology will shew, that there is an especial contrivance behind the knee to give an advantageous insertion to the flexing muscles; and that this contrivance is equally favourable to the freedom of motion of the great tendons which operate on the parts below. When this bony projection (see *trapezium* as a carpal bone in the *Osteology)* stands well out from the hinder part of the knee, these benefits are greatly increased; for not only do the muscles act mechanically to greater advantage, but the flexor tendons likewise, being removed considerably from the centre of their motion, have their powers much increased, and which explains why a horse *tied in* under the knee, as it is called, is never found to be able to bear exertion long; on the contrary, he soon becomes strained, the legs get bowed or arched, and totter on the slightest exertion. Dealers frequently assert that such a horse was foaled so; and it may be true that the colt was born badly formed, but the effects come on afterwards. It may be considered as a rule admitting of few exceptions, that hardly one horse in fifty reaches eight years old with straight legs and sound pasterns, with flexor tendons confined and narrowing this part. The tendons themselves, which are the *back sinews* of horsemen, should also, for the same reasons, be continued downwards, so as to form a surface of great lateral width, but which should be thin posteriorly: the mass of sinew itself should, however, be considerable, and very firm. In blood-horses this form is particularly observed; on the contrary, in the cart-horse the back sinews are seldom proportionally so large, and more seldom are they so well placed. These important tendons should stand wholly distinct and clear from the knee to the fetlock: when any thickening is observed in their course, some injury has been received. If the swelling appear nearer to the bone than the tendon, particularly if it be on the inner side, it betokens a *splint*. When a splint is situated not far from the knee, and evidently distinct from the tendons, it frequently occasions no future incovenience; but when it appears to extend itself inwards and backwards among the ligaments and tendons, it irritates these parts, occasions inflammation, and ends in an enlarged callous swelling. When the flexor tendons and their sheaths are swelled, and rounded, as it were, into one mass with the bone, leaving no distinctive marks between the one and the other, still greater mischief, probably, has at some time happened. Either some of the ligaments have become ruptured, or such a relaxation has taken place from strain and subsequent inflammation as will always keep the limb weak. To detect lesser enlargements of the tendons and ligaments, the eye alone should not be trusted, particularly in hairy-legged horses; but the hand should be deliberately passed down the shank before and behind. The inner and under surface of the knee should also be examined in purchasing a horse; when, if either an enlargement or a scar appear, it arises from what is called the *speedy cut*, or blow given to the part by the foot of the opposite side when it is elevated high in some fast trotting horses. A sore scabby eruption within the bend of the knee sometimes exists, particularly in cart or other low bred fleshy-legged horses. These eruptive appearances are called *mallenders*, and render the horse objectionable, inasmuch as they prove frequently obstinate against healing.

The next part below the canon or shank is the *pastern*. Among horsemen, the articulation between the pastern and shank is called the fetlock joint; but, properly speaking, the fetlock is only the posterior part of the joint of the pastern, from which grows the *foot lock* of hair. When the pastern is very short and upright, the limb is deprived of much of its elasticity, and such horses prove uneasy movers: they are also unsafe, for the pastern being so nearly in an upright position, requires but a small resistance, or slight shock, to bring it forwards beyond the perpendicular, in which case the weight of the machine, uniting with the impetus, brings the animal down. Nor are these the only attendant evils: this formation tends also to an early deterioration of the parts; for the ends of the bones being opposed to each other in a more vertical direction, receive such a jar or shock at each progressive movement, as gradually deranges the part, producing an *overshot* joint, absorption of the cartilages, and thickening of the ligaments. When, on the contrary, the pasterns are too long, they are frequently too oblique likewise, and must then be also proportionally weak; though, from the increased elasticity occasioned by this formation, such horses are commonly pleasant and easy in their paces; and, by the extension given, they must also be more speedy, particularly in the gallop. The enlargements at the bottom of the canon, called *windgalls*, need not here occupy any farther notice than to remark, that although they bespeak undue exertion, yet that, in themselves, unless they are so large as to prove injurious by their pressure, they are not very important. *Cutting* of the pastern joints, when dependent on a faulty formation of the fore limbs, as when they naturally approximate too much inwards, or otherwise when the toes are directed too much outwards, are either of them a serious evil. *Cutting* is, however, frequently brought on by debility and emaciation; hence lean, jaded, and tired horses, will do it at times, that under other circumstances will go free and not "*interfere.*" For the same reasons, many horses *cut* before they become strong and furnished that never do it afterwards.

The *feet* are next to be considered, and in the examination of a horse too much attention cannot be paid to them. They are more liable to be found too small than too large; though in horses bred in low marshy situations, as Lincolnshire and Cambridgeshire, the hoofs are often of a larger size than ordinary; and however convenient this may prove to the animal while moving on the quaggy surface of these marshy districts, they are very unfit for speedy and light movements in more dry situations. Such horses go heavily, and stumble; and as the horn of which these enormous feet are formed is always weak, so, by use on hard roads, the anterior or front part falls in, and the sole, or under surface, projects outward, reducing it, at last, from a concave to a convex figure: such feet are then called *pumiced. Contraction* is, however, the most general evil among the feet of our horses, and some breeds appear more liable to it than others: it is peculiarly the case with blood-horses. Colour also seems to have some influence in contracting the feet; hence I have observed dark chestnuts particularly prone to it. Once on a time in my travels, being asked to dine at the mess of a dragoon regiment, the subject of contracted feet in horses was started, when I was surprised to find that doubts existed with regard to the increased prevalence to this defect in chestnut horses, and more particularly in dark chestnuts. The dinner over, it was proposed to adjourn to the stables, when the majority of contracted feet among the dark chestnut horses was most striking. A good foot should exhibit a proper line of obliquity: when the horn is very upright, however wide and open the heels, such feet soon become defective. This is but seldom attended to, even among those who esteem themselves judges; but no rule admits of fewer exceptions, than that such a foot soon becomes faulty. There should also be a proper height of horn: when there is too much, it disposes to contraction; when too little, the heels, quarters, and soles must, of necessity, be weak, and tenderness in going must be the consequence.

The *heels* should be particularly attended to; they must be wide, and the frog healthy, firm, yet pliable and elastic. Contraction of their cleft is their most common defect, and is often also accompanied with a general lessening of the circumference of the foot. Such a foot will probably feel hotter than natural; the frog also will be compressed and small, and very likely thrushy. *Thrushes* are always strong objections to a horse; for when they exist in an open foot, that foot will not long remain so, if they be not stopped; and as some horses have a strong natural tendency to thrushes, so their existence always deteriorates much from the value of the animal. Nevertheless, when it can be ascertained with certainty that they are not of long standing; when the matter only exudes from the middle cleft of the frog, and not from any lateral sinuses, neither the form nor firmness of the frog being altered, they are less objectionable: and also when circumstances can be learned that prove the horse has been placed in such situations as favour the approach of thrushes, as moist litter or long confinement, then such a horse need not be rejected, for these thrushes may be permanently healed. But when the complaint accompanies a foot already smaller than natural, when the heels are, in the smith's language, *wired* and *drawn in*, and the whole circumference of the hoof perhaps encircled with rings, reject such a horse, let him go as he will, for he cannot long remain sound. When a horse's foot is held up, the sole should present a concave surface: if it be less concave than natural, that sole is weak, and will not bear much pressure; and it is more than probable it will continue lessening in concavity until it becomes a plane, when every subsequent shoeing will endanger the laming of the animal. *White feet* are very objectionable on this account, for they are particularly liable to become flat in the sole: their quarters, also, are commonly weak, and fall in; and when neither of these evils take place, they yet have seldom strength enough to resist contraction: and when there are three dark and one white foot, in nineteen instances out of twenty, the white foot becomes defective sooner than the dark ones. *Corns* are another evil to which horses' feet are very liable; and, unless the shoes are removed during the examination of a horse, it is not easy to detect them: though, when the foot is well picked out, if a corn has been of long standing, some marks of former cuttings out will probably appear under the heel of the shoe. Another very serious complaint is a brittleness of hoof, which may be generally detected by the marks of the fragile parts detaching themselves from every old nail-hole. This kind of foot, particularly in hot weather, breaks away, till there is no room for the nails to hold, when the horse, of course, becomes useless. In an examination of the foot, the eye should also be directed to the wearing of the shoe: if it be unequally worn, particularly if the toe be worn down, such a horse is probably a stumbler, and does not set his foot evenly on the ground, either from defective feet or natural gait.

On a review of the conformation of the fore extremities, it may be remarked, that, although the hinder limbs appear to be more particularly concerned in the quickness of the progression, yet that upon a proper form and a true direction of the various component parts of the fore limbs must depend the elasticity, ease, and safety of the movements. Viewed anteriorly, the legs should stand rather widest at the upper part, inclining a little inwards as they proceed downwards. Viewed laterally, they should be seen to stand in a direct line downwards, neither fowards nor backwards; and the toe should naturally place itself under the point of the arm or shoulder. If the foot stands beyond this, but which is very seldom the case, the action will be confined: such a horse, however, generally treads flat, even, and safe. When the foot stands behind the vertical line, the defect is more considerable; for as it removes the centre of gravity too forward, so it makes the forehand heavy, and inclines the animal to fall; and as, in general, the consequence of such formation is a want of extent and obliquity in the shoulders, so it tends to detract from the speed of progression altogether.

The *carcass* comprises the ribs, belly, and flank. The *ribs* form the chest of the horse, which should be wide upwards, and as much deepened below as possible, affording what is popularly termed great depth in the girth*. The capacity of the chest is dependent on its form more than its mere external measurement; for two horses shall be measured, and shall yield the same apparent dimensions, yet one shall have much larger lungs than the other. It is, therefore, not depth alone in the chest that is required, but sufficient breadth also. This form increases the surface of attachment of muscles, and very materially assists respiration. Posteriorly, the ribs should form the body as much as possible into a circular figure, that being of all others the most extended, and the best surface for absorption: thus *barrelled* horses, as they are called, are justly preferred; for a circle contains much more than an ellipsis of the same circumference. But when the chest is too straight and flat, the *belly* is also small; hence neither can the blood absorb its vital principle from the air, nor the lacteals the chyliferous juices from the intestines in sufficient quantities. Horses, therefore, with these defects are neither long-winded nor lasting in their exertions. As less nutriment is taken up by the constitution, so less is eaten; thus also they seldom are good feeders; and as the pressure on the intestines must be considerable from the small containing surface, so are they usually what is termed *washy*, that is, easily purged, whereby an additional cause of weakness exists, from the too early passing off of the food. Nevertheless, it must be remarked, that these sort of horses sometimes prove better workers than one would expect, and are commonly spirited and lively. A knowledge of the advantages gained by size in the belly is what constituted Mr. Bakewell's grand secret in the breeding of cattle: he always bred from such as would be most likely to produce this form, well knowing no other would fatten so advantageously.

The *back* commences from the withers. It should not be too long, as unfavourable to strength: long backed horses are, however, pleasant to the rider, because the action and re-action are more considerable in a long than a short back, and consequently the spring greater in the one than the other. But what such horses gain in ease they lose in strength; both the ligaments and muscles being longer, must act to greater disadvantage. When the back is too short, such horses, by having their extremities too much approximated, usually overreach. The back may be curved inwards or outwards; when inwards, it is termed *hollow*, or *saddle-backed*, and presents a formation not favourable to strength; but as the counterpoise is kept up by other curves, so the crest is generally good: such horses ride pleasantly, and commonly carry considerable carcass, sometimes, indeed, too much. When the curve is outwards, the horse is said to be *roach-backed*, which form tends to prevent liberty in action, renders him uneasy in his paces, and, from the approximation of his hinder extremities, he will also often overreach; and, as a counteraction to the curvilinear form of the spine, the neck and head are sometimes carried low in these cases. A short-backed horse is in considerable request with many persons; but when the back is too short, there is seldom great speed, for the hind legs cannot be brought sufficiently under the body to propel the mass forwards: the points, likewise, between the ilium and the lower angle of the femur approach too much, and in their flexion press too closely on the abdominal viscera to allow of great extent of motion.

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* See *Veterinarian*, vol. v, p. 547.

The *loins* occupy the attention of all good judges in their consideration of a horse, and for the purposes of strength they can hardly be too broad: the back extends to the posterior part of a common sized saddle, and where the back ends, the loins begin. Sometimes, from a defect in the sacral processes of the vertebræ, this junction of the back and loins presents an indentation, as though the union was incomplete. This may be considered, in some degree, as a defect, inasmuch as it deprives the part of muscular attachment, and such horses are said to be *badly loined.* The strength of the loins depends on the length of the transverse processes of the lumbar vertebræ, which should be long, that there may be an extensive surface for the attachment of the muscles of the back: the muscles themselves should also be powerful on each side, giving width to the loins, and seeming by their enlargement, as it were, to swallow the back bone. When the protuberances of the ilium are very prominent, the horse is called *ragged hipped,* which is injurious to the appearance only, except in cases where it seems to arise from a paucity of muscle to fill up the intervening spaces. From the loins to the setting on of the tail, the line should be long and very slightly rounded; by which means, also, the distance between the *hip* and the point of the buttock will be considerable. This formation is peculiar to the improved or blood breed, and in every point of view appears the most perfect; for it affords a very increased surface for the insertion of the powerful muscles of these parts. And though the large rounded buttocks of the cart-horse would at first sight bespeak superior strength; yet, when he comes to be viewed attentively, it will be found that the early rounding of the sacral line or croup, the low setting on of the tail, and the small space between the hip and buttock, produce a decreased extent of surface, compared with the broad croup, wide haunches, and deep-spread thighs of the blood-horse.

The *flank* is the space between the ribs and the haunches, which part, when too extensive, indicates weakness in the loins, and too great length in the back. A hollow flank is the consequence of shortness in the transverse processes of the lumbar vertebræ, which occasions a want of room for the attachment of the large muscles of the loins. When the flank rises and falls in respiration quicker than ordinary, particularly if the horse be at rest, it betokens either present fever or defective lungs. Should it arise from present fever, other symptoms will also be apparent, as heat, dulness, and disinclination to feed: but when the horse appears otherwise in health, and yet heaves at the flanks more than natural, particularly if the weather be moderate, and the stable not hot, it is probable that such a horse is *thick winded.* If the inspiration of the air appear to be performed readily, but the expiration with difficulty, and the flank, in expelling it, fall with double quickness, and as it were at two efforts, such a horse is *broken winded;*

and his cough, which should then be tried, will be found hollow and sonorous. If no quickness in respiration appear, but on trotting or gallopping a wheezing noise be heard, it is called *roaring;* and though it constitute no present disease, yet it is the remains of a former affection, and it even now interferes with speedy action, and, in law, renders a horse unsound and returnable.

The *tail*, in the improved breeds of horses, is set on high, which is the natural consequence of length in the hinder quarters. It should, however, neither seem to be swallowed up by the buttocks, nor yet to start out ungracefully from the end of the back-bone, but should form a graceful curve with the croup. As the fore extremities may be considered as especially designed to receive and sustain the weight of the body, and to bear the momentum of progression thrown on them, so the hinder extremities may be regarded as the essential propelling organs: having themselves less to support, they are flexed into considerable angles, and which angles are operated on by masses of muscles of immense power. It is also a curious but wise provision in the mechanism of the limbs, that their angles should be reversed; for, while the scapula, or shoulder-blade, inclines backward, the ilium, or haunch-bone, is directed forward. The inclinations of the humerus or arm, and of the femur or thigh, are equally reversed; and, in a slighter degree, the same is observable in the corresponding bones immediately below; by which arrangement the trunk is suspended in equilibrio, instead of falling backward or forward, as might have happened, had all the angles been consentaneous. A view of the skeleton will more clearly exemplify these counter-inclinations. That the hinder extremities are principally concerned in progression, is again evident from the attention that Nature pays to their formation and extreme strength in all cases where great speed is required; for let such an animal be ever so lightly framed in other respects, yet great power will be always displayed in its hinder parts. Thus, in blood-horses, which are derived from the eastern or most perfect breed we are acquainted with, not only are the loins wide and the croup long, but, viewed from behind, these horses will be found wider in the thighs than even in the hips; and of all the distinctive marks between the high and the low-bred horse, this is the most striking and characteristic. A good judge, under every disadvantage, immediately discovers a portion of breeding by this appearance of extent and power in the muscles of the thigh alone. The greyhound offers us also a corroborative instance of similar form and intention.

The real *thigh* of the horse, like the true arm, is so concealed by muscles, as not generally to be known by that name; but a view of the skeleton will readily enable the reader to acknowledge its designation. It will be found, as has been noticed, reversed in its angle of inclination from the humerus, or real arm, to which it corresponds, being articulated above at about the same level, but descending downward considerably lower, and with a greater inclination also, by which elasticity is gained, and the acuteness of the angle resulting therefrom is greatly favourable to the power of action. This bone being able to pass beyond the perpendicular backward, also assists these intentions, particularly when the croup, hips, and thighs, are well furnished with muscle.

The *whirl-bone*, among jockies, is the articulation of the thigh-bone with the pelvis: it is a very strong joint, and but rarely dislocated; yet its ligaments are occasionally extended, when the horse is said to be lame in the whirl-bone, or hip joint.

The *stifle* corresponds to the knee of the human; consequently the part below it (with reference to human anatomy) ought to be called the leg, but is usually known by the name of the *thigh*, or gascoin. It might not be amiss to call the bones concealed under the muscles of the croup and haunch by the terms upper and lower thigh-bones, when treating of the general conformation of the horse. For the reasons beforementioned, the lower thigh should be strong and muscular; it should likewise make a considerable angle with the femur or upper thigh, forming a direct line under the hip or haunch. Its length, as is seen in all animals destined for much speed, should be considerable, and its supply of muscle great: whenever that portion of limb between the stifle and hock is thin, and but indifferently furnished with muscles, that limb cannot be strong.

The *hock*, or *hough*, as it is called by some horsemen, forms the joint between the thigh, commonly so called, and the canon, and may be considered as one of the most complex and important joints of the body: its figure should be broad and wide; for, in proportion as the calcaneum, which (with reference to human anatomy) is the bony process that forms the heel (but called in the horse the point of the hock), extends itself beyond the other bones, thereby increasing the breadth of the joint; so the tendons inserted into it act with a longer lever, and thus with a great increase of power. This joint is subject to several diseases, which are prejudicial in different degrees, and therefore require different degrees of attention. When, on examining a horse, a soft puffy swelling is discovered within the ply or bend, it is termed a *blood spavin;* but which is, in fact, nothing more than a windgall, or enlargement of the mucous capsules of the joint which lie under the vein of this part; and what was said of windgalls in the fore legs applies also to these. The mucous capsules on each side of the hock also, at times, become enlarged, and are then called *thoroughpin*. At the back part, likewise, of the joint, the ligaments are liable to extension or other violence, when the shank, instead of exhibiting a straight line from the point of the hock downwards, presents in this case a curved surface, accompanied with heat and tenderness, which is then called a *curb*, and sometimes produces slight lameness. The inner part of the joint at its bend or ply is subject also to a similar scabby eruption to that of the fore legs, called *sellenders*. To detect the existence of *bone spavin*, the hocks should be attentively viewed from behind, when any enlargement in the spavin place which is within, and slightly anteriorly of the general surface of the joint, may be easily detected. From this enumeration, it will be evident that a strict examination of the whole joint is very necessary in the purchase of a horse. In the consideration of the parts below, what has been said of the fore extremities applies equally to the hinder.

THE COLOURS AND MARKINGS OF HORSES.

The colour of horses, being derived from their hairy covering, is necessarily very varied. Numerous conjectures have been entertained as to what was the *original* colour of this animal: but the inquiry has not been attended with success; for the horse is seen to perform all his functions under any tint; though fancy, and perhaps experience, has appropriated particular constitutional properties and mental qualities to some hues more than others. The various colours of horses would seem to be truly original and inherent; for such of them as have, from a state of domestication, been suffered again to run wild, have retained the colour they carried with them, although their form has altered, and submitted to the agencies of climate. Neither have the original horses of different countries, according to the accounts of travellers, exhibited any individual characteristic hue. The horses of the East are not darker than those of the North; on the contrary, we have white Arabians, and we procure the darkest breeds from the north of Europe; while in Russia bright bay is as common a colour as any other. Geographical distribution is not, however, wholly without its influence on the hair; for our heavy breeds, drawn from the northern parts of Europe, are very frequently black; but a full blood black horse is very seldom met with. Age has likewise a powerful effect on the tinting of the hair; that of the colt alters many shades; in some cases it becomes much lighter, and in others altogether much darker, as the adult period arrives. But the alteration in them which takes place between the time of full growth and that of old age, is invariably from a darker to a lighter hue.

The colours of the parents, among horses, appear to be nearly divided in the offspring; to which adherence in the propagation of the external covering, we are indebted for the endless variety of shades found among them. It was probably to add to the personal beauty of this animal, that in many the mane and tail are either much lighter or much darker than the short hair of the body; which variation tends greatly, in the painter's language, to relieve and throw up the body-hue. If nature, in these varied markings, had personal beauty really in view, as from analogy we may suppose, it would then be natural to conclude that the original horses all had it; and as a contrasted tint of mane and tail is common to some colours more than to others, as the sorrel, light chestnut, bays, &c., can any conjecture be thence drawn as to the hue prevailing among the primogenitors of the genus? Besides these contrastings of colours, we may add those markings frequently met with, such as the dark dorsal stripe of some breeds, as well as the bandings or stripings common on the legs and arms of others, of the duns particularly. The humeral cross stripe is principally found on the ass; faint traces of it, however, are now and then seen on some horses, but which, like some other anomalies, may be rather considered as minute links of assimilation to other more remote members of the genus. A still more usual contrasted marking is found on the joints, which are in many horses several shades darker than the rest of the body, and in some others altogether black. The dappling in the grey, the bay, the brown, &c., may be regarded as original markings also; intended, like the spots of the tiger and panther, to add to the beauty of the animal, and cannot be considered as arbitrary deviations from nature, gained by domestication or crossings in breed.

On this subject it may be observed, that there is a sensible difference between the markings imprinted by nature, and those which are either accidental, or added by artificial agencies in operation since the subjugation of this animal. The former please every eye; we receive them *instinctively* even as beauties, and they never offend: whereas most of the accidental markings, and such also as appear to be the consequence of cross alliances, or other effects of domestication, however custom may have forced on us the adoption, yet most of them are found to prove unpleasant to many eyes. Piebald horses are displeasing to some; and others can never become reconciled to the tiger-spotted. Extensive markings of white on black horses offend all, and hence, without doubt, were not original. Hair is also influenced in colour by the skin it adheres to; thus, thin-skinned horses have light hair; and where there is white hair, there are usually light eyes.

The *colours* of horses have been divided into simple, compound, and extraordinary; and this division may be adopted for convenience, but is by no means precise. Buffon calls the simple colours, white, dun, sorrel, bay, and black; to which ought to have been added, the chestnut likewise. White and black are not unfrequently extended over the whole frame, but the dun and sorrel are commonly found united with contrasted markings; and the bay usually presents the mane, tail, and joints, darker than the hair of the rest of the body. The chestnut, in all its shadings, is found occasionally entire; but the dark tint of it is more frequently so than the horses of any other tints, the white and black not excepted. Compounded colours are the grey, the mouse, the roan, the red-roan, and the grey or flea-bitten roan; to which might be added, such bays as are dashed with black, and such bays and browns as become much lighter towards the bellies and flanks, and such dark browns as have very bright tan muzzles, &c. The duns are also somewhat compounded when they are *listed.* Extraordinary colours are the tiger, the piebald, the strawberry, and the flea-bitten.

Simple Colours.

The *white* is by some not considered a fixed colour with horses, as it is supposed to be always produced by age; but this is erroneous, for we have had many instances of pure white horses; although it must be confessed that an original white horse, compared with such as have become so by age, is as 1 to 100. The colt colour of the white horse is a light grey universally spread; but in such white horses as have become so only by age, they were, as colts, of a more shadowy grey; and I believe in them it is always accompanied with a much deeper tinting of the joints than of that of the body colour generally.

The *dun* has numerous degrees of intensity; the lighter is frequently accompanied with a dorsal list: many are very favourable to this mark, and I believe, with them, that it does not often accompany a very bad horse; but, in a general point of view, experience has not stamped dun horses with desirable qualities. The pure dun is of a simple lead hue, but there are other shades which arise from an intermixture of other colours. The mouse-dun is an instance wherein black hairs are united with the dun. Occasionally, dun horses have white, or at least light, manes and tails, which relieve them much.

The *sorrel* has several degrees of shade; many of which might, perhaps, with propriety, be considered rather as chestnuts, with a dash of light red. The sorrel is very often *foully* marked with white, and is altogether not esteemed, although it occasionally yields some good horses. *Bay* is a most esteemed colour, so much so that the imaginative Buffon conjectured it was the original hue of the horse. There are various shades of it, as the bright, the dark, the dappled, and the brown. The bright bay is a beautiful tint, and is often accompanied with a black mane and tail; and occasionally the bright bays have a dorsal listing: some are singularly glossy, and shine in the sun with a sparkling gilded richness. The dark bays, in addition to black manes and tails, have their joints, and often their legs from the knees and hocks, black also. The dappling of bay horses, where it exists, adds much to their beauty: in some it is faint, in others it is more conspicuous; but in all it is pleasing, and by many persons is greatly admired. The *brown bay* is in very great estimation with many excellent judges, who aver that there are more good horses of this shade than of any other: in some of them the muzzles, flanks, &c. are of a tan colour, and such marks, when lively, are considered as additions to the promise of excellence given by the colour generally.

Chestnut appears an original colour, for it is often without mixture; at the same time that the several hairs in many instances present, each, two or more varieties of tint: in the intermediate shade between the bright and the very dark chestnut, the hairs are, as it were, gilded towards their points, which gives them a lustrous brilliancy similar to that observed in some bays. Light chestnut horses have frequently a large intermixture of white markings: in the coarse breeds the whole face is often white; and in all, the legs and feet are apt to be so likewise, which, as regards the feet, renders such markings peculiarly objectionable. The very light chestnuts, and the sorrel, have, however, often white manes and tails, which add much to their beauty, and somewhat compensates their other *foul* marks. The lighter shades of chestnut are supposed to characterize debility of constitution; and some facts seem to bear out the opinion: yet the Suffolk punch, which is of this colour, presents a most hardy, strong, and useful race of draught-horse. Dark chestnut horses, as already noticed, are often of the same tint throughout the whole body: in temperament they are also commonly considered hot and fiery; and their feet are certainly more subject to contraction than those of any other colour, or of any other variety of the chestnut colour. *Black* is not an esteemed colour, although black horses present all varieties of character, from the most fiery and impatient to the most sluggish and dull. Many persons affirm, that there are more bad black horses than of any other colour; and I am very much of the same opinion; yet it must be allowed, that a shining glossy black, without an undue mixture of white, is very beautiful. It is, however, seldom that they are wholly without. A white star in a black horse is, however, a great beauty, and a small race is not very displeasing; but more than this constitutes a blemish. Black horses which have brown muzzles and flanks are not only greatly relieved by the mixture, but if markings go for any thing, such usually prove here favourable omens. Many coarse cart-horses have their mouths and flanks of a mealy tint, which is usually accompanied with white legs also.

Compound Colours.

Grey horses admit of several shades, or different proportions of white and black, as dappled grey, silver grey, and iron grey. Grey horses are by many valued on account of their beauty: sometimes a slight tint of bay, mixed with the white and black, forms a pleasing variety in this colour. Grey horses, like the black, admit of no settled character, but have all the extremes within their range: the darker are considered the best. The dappled grey is a general favourite for his beauty, and such a one retains his colour the longest of any of the greys; but, eventually, he also must submit to the bleaching effect of time, and approach to a white. The iron grey has sometimes a mane and tail much lighter than the rest of the body, and the difference occasions a very pleasing contrast; and the intermixture of red hairs which forms the nutmeg grey is very pleasing. The mouse *dun* is only the simple dun with a mixture of a darker hue. The *roan*, which is composed of red and white, gives much diversity in its tintings, and an equal one in the quality of the horses it characterizes: there are excellent roans, and there are many very indifferent ones. The coat of the common roan is occasionally intermixed with white in unequal degrees, and in irregular patches: such are called mealy roans, and have often flesh-coloured muzzles and red eyes. The nutmeg roan, the red roan, and the dark, yield handsome and good horses frequently; as well as the flea-bitten, which presents itself on a light grey or white ground (commonly the former), where small bay spots form the mixture. The strawberry roan differs from the flea-bitten only in having the bay sprinkling more diffused.

Extraordinary Colours.—Of these the principal are the tiger-spotted and piebald: the subordinates are the strawberry, the flea-bitten, the mealy white, and mealy roan. The *tiger-spotted* are not common as native horses with us, but are much more so in some of the northern countries, as Germany and Sweden. Mr. Karkeek speaks of them as frequent in Asiatic Russia, among the Moguls. The tiger and leopard-spots in such horses always exhibit two colours, independent of the prevailing tint of the horse: the ground-spot is large, sometimes irregular, and may be black, white, bay, or sorrel. The central-spot is sometimes darker and sometimes lighter than the ground-spot, but is always contrasted: it may be yellow, chestnut, red, dark bay, &c.: now and then it is white, but this is not common. In England, the piebald is most frequently met with among those that may be called extraordinary colours, and usually consists of white and some other colour, placed in different parts distinct from each other, as white and bay, white and chestnut, or white and black. With many, these horses are favourites; and the contrast, particularly between the bay and the white variety, is pleasing: that between the chestnut and white is less so; and least of all, the white and black. The age of superstition is so much on the wane among the inhabitants of cultivated nations, that we hear little now among ourselves of unluckily-marked horses. But in most eastern countries, more particularly in Arabia and Persia, some markings are still considered as omens of ill-luck to the possessor, or of evil to the animal. The placing of the colour of the *stockinged* horse, as such as shew much white on the legs are called, must be critically drawn to certain lines of demarcation to be fortunate. When it is otherwise, the animal is rejected: foals born with some marks are immediately destroyed, however valuable the breed. Experience has certainly taught us, that the *ratio of qualities*, good or bad, are somewhat connected with particular tintings, and particular placings of colour. Dark horses, of all hues except black, are esteemed the best for durability of constitution, and aptitude for exertion. Light-haired horses, on the contrary, like white-haired persons, are more irritable, and weaker than those of darker tones; the hair which appears on the skin after a wound is white, because the part is in a state of debility. The white legs of horses are more prone to grease than the black; and white feet are much weaker, and more disposed to disease, than those which are dark.

OF THE VARIED FORM OF THE HORSE, ACCORDING TO THE SEVERAL USES TO WHICH HE IS APPLIED.

It is evident that, according to the several purposes to which we apply the horse, so great variations in his bulk and proportions are necessary. The fleetest racer that ever scoured the plain would cut a sorry figure in a London coal-waggon; and the most splendid among the stallions of Barclay's brewing establishment would be ill-fitted for a breathing over the courses of Newmarket or Doncaster. Let us figure to ourselves four Shetlanders in a Portsmouth drag, or Lord Sefton's lofty buggy-horse in a garden chair or pony-chaise, and we shall be at once convinced that, had not climate operated in producing different races of horses, and with very different proportions, the industry of man would still have enlisted the agencies of domestication to bend his frame, as well as those of horned cattle and of the dog, to his purpose.

The form of the *racer* at once points him out as an animal intended for great velocity of motion. His aboriginal outline, as derived from the east, betrayed a similar intention; and as his uses have been principally confined to a display of these powers of locomotion, so it has been the endeavour of the breeders of this variety, by the arts of domestication, to mould his form, and fashion his organs, to a capability for velocity even greater than that intended by nature; which is evinced by the circumstance, that none of the eastern horses can now compete with our race-horse. But to effect this sûperiority in any great degree, some of those qualities which in most of the other uses to which the horse is put are absolutely requisite, must, of necessity, be sacrificed; for nature, to keep up a true balance between her creatures, never gives to any individual the united advantages of all. In the race-horse, the sacrifices at the shrine of velocity are safety and ease, as regards progression, and strength as regards the bearing of burdens or the drawing of loads. In many other of the uses of the horse we require that his fore extremities shall command a principal share of attention by their own height, and by the elevation of the withers and crest they accompany. In the racer, on the contrary, as in other quadrupeds remarked for speed, we are more attentive to the hinder extremities; convinced, as we are by analogy and experience, that they must be long, to maintain a preponderating influence over the whole remaining portions of the machine, which they are the principal agents in displacing and propelling forward. In the racer, we do not endeavour to produce any other than a circular form of carcass, for none is so good for all horses; but we do endeavour to lessen its diameter generally. By every means in our power we therefore draw up the belly, as it is called, that we may not only lighten the animal thereby, but also that we may obtain more room for the operation of the true thigh of the horse, which would be otherwise obstructed by the pressure of heavy viscera on a full belly. But in the degree that we take liberties with the belly towards the loins by *drawing it up*, we must enlarge the capacity of the trunk forwards. We therefore not only prefer a deep chest, but one also of large diameter. 'The capacity of the chest depends on its form more than on the extent of its circumference; for where the girth is equal in two animals, one may have much larger lungs than the other. A deep chest, therefore, is not capacious, unless it is proportionably broad. The external indications of the size of the lungs are the form and size of the chest, the form of which should approach to the figure of a cone, having its apex situated between the shoulders, and its base towards the loins.'—*Cline on the Form of Animals.*

Such a form of chest is essential to the racer, and was found in his primogenitors. Its advantages are, first, that it receives the volume of digestive organs somewhat displaced by the powerful action of the abdominal muscles in training. Lodged here, the digestive functions can be carried on to the proper nourishment of the animal. Secondly, by this form the lungs, which are of the first importance to the racer, can expand to meet his exigencies. 'It is on their size and soundness that the strength and health of an animal principally depends. The power of converting food into nourishment is in proportion to their size. An animal with large lungs is capable of converting a given quantity of food into more nourishment than one with smaller ones.'—*Ib.*

We must not, however, hold the operation of the fore extremities too cheaply; nor be inattentive to the necessity of perfection in their form. The principal weight of the machine is borne by them; they sustain the head, neck, and trunk; and they not only stand as opponents to the inordinate power of the hinder extremities, but they also take a portion, though a limited one, of the progressive movements; for they draw the hinder extremities forward at the moment when these latter have expended their force, by flexion and extension, and thus place them in a situation for new action. If it is not of consequence to the racer that the general fore-hand be equally high with the hinder parts, it is however so, that the shoulder be deep and oblique, and such form of it usually, but not always, accompanies a deep and capacious chest. The arms, under the above views, should be powerfully formed throughout; and it is particularly necessary to their freedom of action in the gallop, that they stand well out, and perpendicularly, as a columnar support. As a summary; the racer should exhibit the greatest possible quantity of bone, muscle, and sinew, condensed into the smallest possible bulk throughout the whole machine. The body also should be sufficiently long to allow of free flexion of the hinder extremities: it is an axiom with the best judges of the racer, that 'there must be length somewhere;' but the *where* has occasioned some difference of opinion, which arises from not forming an opinion on just mechanical principles. It is argued by some, that long legs can propel a short body forward, and which is partially true; but our most perfect model of speed is the greyhound; and a very short bodied greyhound is seldom seen, and still less seldom is such a one seen to run well. It is evident that the hinder extremities cannot be carried beyond the extent of the angles allowed by the direction of the bones: if carried further, they would endanger the safety of the articulation, or an injurious pressure on the carcass they propelled. A short body, therefore, is injurious to speed, both by mechanically preventing the full extent of the action of the hinder extremities, and also by losing as much at each stroke of the gallop as is the difference between its length and that of one differently formed; which, if it were only one inch, yet, when multiplied by a number of strokes over the Beacon course, would amount to an important distance in a closely contested race. Both length and breadth in the hinder quarters have been already proved to be essential to the well-formed racer. It is hardly necessary to add, that the thighs should be muscular in the extreme, the hock broad, and that, like the knee, it be placed low down in the limb: the hinder pasterns, like those before, should be long and oblique, but with strength sufficient to combat the strain on them. The *hunter* of the present day, be it observed, is totally a different animal to what he was fifty years ago. To follow hounds of every kind, as they are now bred, the hunter should be but one, or at the most two, removes from a full-bred horse: some now in use are altogether full-bred. Consequently the selection of a hunter, under the present system, combines the qualities of speed met with in the racer with as much additional bone, muscle, and extended form altogether, as will enable him to carry more weight, and support it during a long course of fatigue and privation. Therefore with the following form, the more of those qualities that usually accompany what is called full-blood, the better: the breed yielding the speed and determination, and the form providing for the application of these qualities to the purposes of the rider.

The body of the hunter may, with propriety, be shorter than in the racer: a short cylinder can sustain more than a long one; and there is much difference in weight between the jockey of eight or nine stone, and the sportsman of twelve or fourteen; as well as between the race of a few minutes and the burst of an hour. The lengthened stride of the race-horse, allowed by a long body and contracted belly, would exhaust the hunter, and would sink him injuriously in deep soils. A shorter and quicker gallop, the consequence of a shorter body, tends likewise, on most occasions, to husband his resources. Moderate length of body only is also favourable in ascending ground; and it is equally so in easing the concussion of descending the same, by shortening the stroke. The hinder extremities, in the hunter, should present all the principles of speed of the race-horse, with as much additional bulk of muscle, and compactness of joint, as are consistent with the probable velocity required, and the weight he is to carry; for if it is essential that the racer should be powerfully formed behind, to propel him forward in the gallop, so it is equally necessary that the hunter should be well formed in his fore extremities, well formed in his loins, and well *let down* in his thighs, that he may have not only speed in his gallop, but that he may have strength to cover his leaps, particularly when they are extensive and numerous. As regards the feet in the hunter, they had better be too strong than too weak: a thin, weak, and shelly crust is a very bad property here, for a sudden misplacing of such a foot, on an uneven surface, will often bring him down as though he was shot.

The *hackney*, more than any other variety of horse, adds to our health and comfort; we ride him for amusement, and he transports us long distances on our personal avocations. On some only of these occasions speed is desirable; but on all *safety* is indispensable; and next to that, is the ease with which his motions are performed. These requisites remove the hackney still further than the hunter from that form which best suits the purposes of the racer. In the hackney, therefore, we scrutinize his fore quarters with the same attention that we pay to the hinder parts of the racer; for, as to the purposes of the latter, the fore parts are subordinate to the hinder, so in the hackney, speed being infinitely less important than either ease or safety, and particularly the latter, it is essential that his fore parts be so formed as to ensure these properties. And here it may not be irrelevant to inquire, on what does the safety of action mainly depend. Is it on any particular care of the animal himself in his progression? or does it necessarily arise out of certain peculiarities in his formation, dependent on such an elevation of his feet as will ensure his not stumbling by any erroneous placing of them? The close observer, I think, will answer, that both are concerned: many horses go safely, and yet by no means elevate their legs high; but such are attentive to their steps; and when they see stones or other risings in their path, carefully avoid them. In my early practice I was called on to examine a horse intended for the French court, at the stables of that veteran dealer Choppin. I objected to the horse that he went *close to the ground*, which even his owner could not deny: but he still argued, that, although he did appear to go near the ground, yet he was particularly safe in all his paces; and as a lure to the purchase, would have offered a bet, that on the roughest ground he would not make one trip. As the animal in all other respects was desirable, ground purposely stony in the extreme was chosen, over which he was tried; and it was singular to remark, that in every pace he accommodated the elevation of his feet exactly to the elevations of surface they were to pass over; but it was with a kind of frightful nicety to the observer. On the same ground, many high actioned horses, from inattention to the matters on it, might have tripped by meeting any usual rising; or by placing one of the feet on a rolling stone, might have fallen altogether. But it is not hence meant to argue, that the most careful hackney which does not naturally elevate his feet is a desirable one. Horses, it is true, are in a great degree crepuscular, and see in a very moderate light. But would such a horse be safe to ride at a brisk trot along an uneven road in a dark night? Or even in a long day, might not fatigue bring his feet down without his usual caution?

The *fore-hand* of the *hackney*, therefore should be elevated, and his shoulder by all means must be oblique; so that he may not only lift up his feet, but also ride pleasantly and *lightly in hand*, as it is termed by horsemen. To which latter valuable quality it is also essential that he have a neck of just proportions, and that his head be particularly well placed on it, so as to afford him room for flexing himself to the action of the bridle, which, in the hands of a good rider, will sometimes constrain him to throw himself on his haunches, and at others to carry himself forward for more speedy progression. The remainder of the fore limbs ought to present a perfectly vertical line to the pastern, which should have such length and obliquity, and such only, as shall bring the toe directly under the point of the shoulder. The body should be circular, neither long nor very short; his saddle-placing good, his flank on a plane nearly with the rest of his carcass, his loins wide, and his croup gently curved only, to allow of a graceful setting on of the tail. From hence downwards, the principles already laid down when treating on the exterior formation generally, will apply; particularizing only, that for this variety of horse a good foot ought never to be dispensed with. Height is not so essential in the hackney as in the hunter; it need never to exceed fifteen hands two inches; in most cases it may, with more propriety, range between fourteen hands three inches, and fifteen hands one inch. Altogether, his frame should be compact, without being in the least clumsy; and with this form, the more *breeding* he shews, short of full blood, the better.

Coach-horses should be nothing more than very large hackneys; and whoever is at the pains to consider the matter attentively will agree with me, although it is not usual to regard the matter exactly as I have stated it. Horses for two-wheeled carriages should be the same, but something smaller. The former are perfect between fifteen hands three inches and sixteen hands one inch; the latter between fifteen hands one inch and fifteen hands two inches. No horse is so adapted for quick draught as a powerful hackney: why, otherwise, do we take such pains to lunge and rein up our carriage horses, but to lighten them before? When we again go back to old times, and read advertisements holding out safe and *expeditious* travelling from London to York in *six* days, then we may safely resume the old Flanders breed.

The *heavy draught-horse*, usually called the *cart-horse*, has likewise submitted to improvement, many being now purposely bred with lighter and higher fore-hands; by which their motions are much accelerated, to the advantage of the transit of light roads, as in fly waggons, and on rail-roads, and likewise to some agricultural purposes. The horse called the Suffolk punch, by this alteration, is enabled to plough one-sixth more than formerly. But where the weight and resistance to be overcome are great, weight and bulk in the animal used on the occasion are required; and here a heavy fore-hand, and one not too elevated, is favourable to the exertion used. In cases where draught-horses are employed in the transporting of heavy loads without loss of time, as in coal-waggons, brewers' drays, &c. &c., then height is very properly combined with great substance; and the horses seen thus employed, particularly in our coal-waggons, in the streets of London, are splendid specimens of bulk and power. The traveller through Normandy must have remarked them there also equally fine. The general form of the *cart horse* should, therefore, present (but in different proportions, according to his uses) size and weight, with every mark of power; his limbs should be rather short than long; his joints large and firm; and the whole should evidently be operated on by powerful masses of bone, flesh, or muscular fibre: the simple fat of some of our draught-horses adds little to their weight and nothing to their strength; but the food which produces it robs the poor of many a meal.

SECT. V.

THE PACES OF THE HORSE.

HAVING considered the horse in a state of rest, we will now consider him as an animal of motion. The principles of progression or locomotion are the same in all quadrupeds, and depend on an impetus given to the body by a change in the centres of its limbs. The limbs themselves being composed of portions moving on each other, form angles, the extensions and flexions of which are operated by the muscles. The various degrees of velocity communicated by these means are called *paces*, which may be divided into *natural* and *artificial*. The natural paces of the horse, or such as he assumes in a state of nature, are the walk, trot, and gallop.

The *Walk*.—In walking, one of the hinder legs is first elevated and carried forward; the centre of gravity is by this means displaced, the chest thrown forward, and the fore legs become inclined backward; to relieve which the animal moves the diagonal fore-leg. In the next action, the other hind leg follows; the trunk is again thrown forwards over the fore legs; and again, to relieve it, the fore leg, that has hitherto been at rest, moves on. This is the most simple account of the walk that can be given; but the simplicity of this pace is by no means so great as may be at first supposed. It is not only completely altered as the animal conducts it slowly or quickly, in which cases it will be either successively or simultaneously conducted; but, like the trot, and the amble or pace, it may be performed either laterally or diagonally. Neither is it invariable that, according to Borelli, the horse '*incipit gressus pede postico*,' to establish a new centre: on the contrary, instead of a hinder leg, occasionally the horse advances a fore leg; but in these cases it is rather a preparatory movement than a progressive one. Mr. R. Lawrence describes the walk as a pace wherein one foot only is elevated at a time; but which account applies to none but to a walk of the slowest kind, and even that is at times conducted in two different ways. In the one, the legs are laterally and successively in motion: the near hind leg, being first elevated, is set down short of the near fore leg, which is then raised also, and being set down, the off hind leg rises, and sets itself down short of the off fore, which is then lifted up; and this finishes the round of action. In what may be termed the diagonal slow walk, and which is the most common, the legs move in the simple manner described at the commencement of the subject. That in the walk 'three legs are *always* on the ground,' as stated by some writers, is erroneous, and will be apparent when it is

recollected, that a good walker places his hind foot even some inches in advance of the print of his fore. The rapid movements of the feet make it very difficult to detect the cadences in the walk: I have attentively watched them from time to time, but have seldom satisfied myself. Mr. Freeman, in his elaborate work on horsemanship, thus describes the quick walk; and as his ideas on the subject of this pace are perfectly in unison with my own observations, I shall use his comprehensive account of the matter. He supposes D to be the near hind, and C the near fore leg; B to be the off hind leg, and A to be the off fore; consequently they will stand evenly; thus,
D—C
B—A. This being premised, he proceeds, 'I found that, supposing A the off fore leg to begin, it was immediately succeeded by D, the near hind; but B, the off hind leg, seemed not to follow the fore leg at the same time as before (i. e. that was in the walk of the pace), but this was nothing more than the alteration of the poise of the body, when either the one walk or the other took place. For when B, the off hind leg, began, it was succeeded by A being lifted up; and when B was set down, D was lifted up. But A and B seemed in this walk so connected together by the poise being on the same side, that B appeared to begin. The poise being altered by the will of the horse, A seemed to begin, and not to be succeeded by B being set down at the same time after it, as in the walk of the pace. D is in both cases taken up after B is set down; and when A is set down, C is taken up, to make room for D to be set down.'

It must be remarked, that Mr. Freeman had, before this quotation, been describing the *walk* of the *pace*, into which many horses may be hurried, and some others assume naturally; but which, in all, is now considered as a defective action, from the decrease of manege riding with us: and unless this be taken into consideration, Mr. F.'s description will appear somewhat confused. From the account I have given of the true walk, it will appear that whether it be conducted slowly or rapidly, the equipoise or balance will be placed diagonally, and so conducted by the supporting members; from this walk, therefore, the trot can be at once produced without disunion or change of centre. In the pacing walk, acceleration produces the amble, provided no change of centre take place, or, in other words, provided no interruption to the unison and harmony of the moving members occurs: for, in this walk, the limbs acts laterally, and not diagonally. The change of the centre or equipoise of the body is sensibly felt by the rider when either the walk of the pace or the walk of the trot is substituted for the other; but however attentively the eye may be fixed on the limbs, it is always very difficult to see the change at the moment it occurs.

The *Trot.*—This pace, when true, is always performed diagonally, but the limbs are very differently occupied, according as the action is slow or fast. In the slow trot, the diagonal legs, as the off fore and the near hind leg, are elevated and replaced together; while the other diagonal limbs remain on the ground to sustain the weight of the machine, although they are evidently making ready to take the place of the moving ones; as exemplified in *fig.* 1. It is to be observed that this mode has been given as the true detail of the trot under all its degrees of celerity: but which is erroneous; for when it is conducted with some degree of celerity, there is a period in every spring made by the diagonal members when all the feet are *in the air* at the same time, and the body is completely elevated from the ground. (See *fig.* 2). To exemplify this, we will suppose a horse trotting at the rate

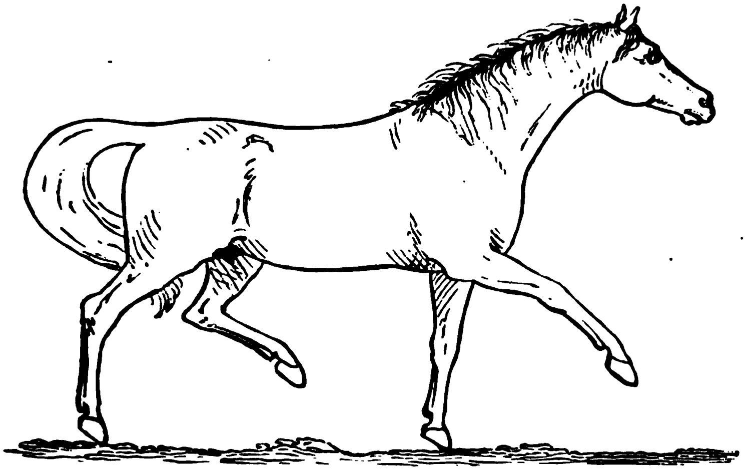

Fig. 1.

of ten or twelve miles an hour, and that the off fore leg and the near hind have been elevated in the air; in such a case, before they meet the ground, the near fore leg and the off hind are not only prepared, as in the slow trot, to elevate themselves, but in this accelerated motion they actually do so before the others are set down: consequently the feet at this precise time must be *all in air*, as seen in the *2d figure*. In the slower trot, as seen in *figure* 1, the near fore and off hind legs are preparing for elevation only, while the off fore leg and near hind are yet in action, and these raised legs are, in this instance, first set down before the near fore foot and off hind are actually

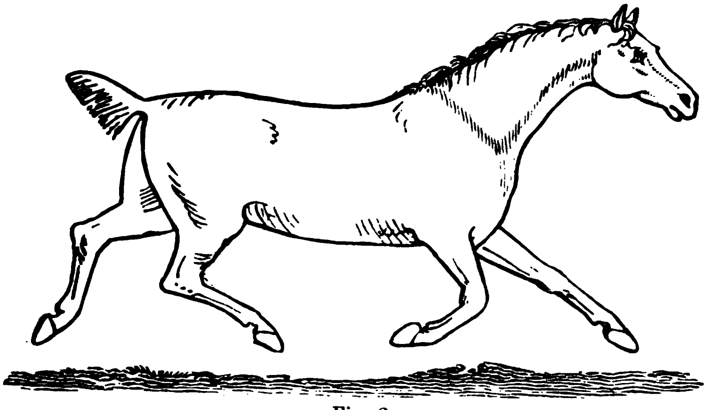

Fig. 2.

removed from the ground. But I again repeat, to impress the matter, that in a fast trot these same feet are completely lifted from the ground, while the off fore and the near hind are yet in full progress. At this moment, it must be clear that the horse is *all in air:* and it is this complete elevation from the earth which forms the essential difference between the slow and the extended trot. To pursue the description, the animal still acting on the impulse derived from the near fore and off hind, they become carried across the off fore and near hind at the moment these latter meet the ground. The off fore and near hind having met the ground, immediately prepare to rebound from it, and to give a fresh impetus to the motion before the near fore and off hind legs again come down; which then forms the second period when the horse is *all in air*, or, in other words, is again aërially elevated, and as totally detached from the ground as a bird when flying, or as the horse is understood to be when either leaping or gallopping. If it should still not be readily comprehended how the horse should be without support at any time during the trot, let us draw a parallel between the progression of a biped and that of the horse. In the *walking* of a man, one foot becoming elevated is carried forward, and set down; during which the body is likewise carried forward, and the centre of gravity takes a new line through the moving mass. The contrary foot is now elevated also in its turn, and repeats all the phenomena of its fellow. In *running*, so essential a difference may be observed, that let running be conducted ever so slowly, and walking ever so fast, so that the speed shall be greatly in favour of walking, yet the paces will remain totally distinct. In the *running* of man, as well as in the extended trot of the horse, there is a period when all the supports are completely removed from the ground: for by means of the flexion and extension of the angles of one of the lower extremities of the man, a spring is made, which displaces and elevates the body, inclining it forwards, and taking the first elevated leg with it, which, before it meets the ground, is crossed by the other. The body, losing its impetus, waits for fresh impulse to be gained by the rebound of the limb which was last elevated, and is by that means again propelled forward; the contrary leg once more passes, to be ready to receive the propelled weight thrown on it, and again, by flexing and extending its angles to relieve itself, it renews the action. Exactly the same happens in the extended trot of the horse as in the running of the man, for here the fore and hind diagonal extremities of the horse, acting in unison, form themselves, as it were, into a single support, as one leg, the centre of motion being placed diagonally across it; by which the superincumbent weight, although moving on two distinct members, yet these members, acting in perfect accordance, produce one effect. The principles of the trot, therefore, are illustrated by the running of a biped, and correspond with it in the mechanism of its action. Though the *trot* has not been generally understood among horse amateurs, as being a pace wherein the feet were all in air at one period, yet a very little consideration will put the matter beyond doubt, and make it clear to the meanest capacity. In the first place, it is evident, that the utmost limits to which the limbs could extend themselves, would not cover the space of ground which is passed over in the extended trot by each diagonal spring did the feet remain in contact with it, as in the slow trot; but being wholly freed from it, as may be seen by marking the impressions of the feet in soft soils, they are propelled through a space equal to the impulsive force they receive. *Figure* 2 will display these principles, and present the legs as they may be seen in the reflection of a horse in the extended trot, as it may be gained by means of a looking-glass. As this fact is even yet disputed, a second proof may, perhaps, serve to render it yet still plainer, by considering the action of overreaching or clicking, which occurs in heavy, awkward, or unbroke horses; but particularly where the hind quarters are high, the back short, and the fore quarters low and heavy. In these instances, the balance of power being with the hinder parts, and the angles favourable to their flexion, they act quicker; and hence the hind toe is brought to the fore foot before that is altogether ready for it, or, in other words, before it is removed out of its reach: but in the worst cases, the hind never so far surpasses the fore foot in quickness, as for the hind toe to hit the fore heel; but it always meets the middle of the under, or shoe surface, being at the precise time that the fore foot has commenced its elevation; but which, in case the action was perfect, it would not do, for the fore foot would then have been completely elevated before the hinder had reached it.

The *Gallop*.—What is called the gallop may be properly divided into three varieties of the same original action of the limbs. These are the racing gallop, or gallop of full speed; the slow, or hand gallop; and the canter. It is not usual to consider the canter as otherwise than a slower gallop; but whoever will pay sufficient attention to the subject, will perceive that there are essential differences between the two: I am, however, not disposed to agree with foreign manege masters, who consider all the gallops as distinct paces; on the contrary, I think them all constructed of one and the same action; of which a sufficient proof presents itself in the certainty that the horse can change from either of the gallops into any other, without alteration of his centre of motion or equipoise, or without interrupting the harmony of the moving members; but merely by an increased or diminished effort of the same action.

The *gallop of full speed* is the most simple of all the paces, for it is nothing more than a succession of leaps. Simple as it is, it cannot, however, in any instance, be commenced without the intervention of the slower gallop, in which one of the hinder legs is first advanced to establish a new centre; for it would require too great an effort to raise the foreparts at once from a state of rest by means of the loins, and to throw them forwards, at the first action, to a considerable distance by means of the haunches and thighs. This fact is well known to jockies, and other sporting characters, and they often derive profit from the circumstance, by wagering with the unwary, that no horse shall be found to gallop one hundred yards while a man runs fifty, provided each start together: in which case, so much time is lost in acquiring the due momentum, that the man wins: make but the race for one hundred and fifty yards, and the horse would beat; for now the impetus being acquired, arrives at its full momentum; in which the foreparts when raised are thrown forward by the force of the flexion and extension of the angles of the hinder parts; and as both of the fore, and both of the hind legs, in the gallop of full speed, become opposed to the ground in succession at the same moment, that is, as the two fore feet at once beat the ground together, and then the two hinder, so it is evident that the gallop of speed is nothing more than a repetition of leaps.

The *Hand-gallop*, when acted true, and with the right shoulder forward, may be described thus: At the instant the horse elevates his fore quarters by means of the muscles of the loins, he throws his fore legs also forwards, through the agency of the muscles distributed to the shoulders and arms: but it appears that he does not elevate his fore limbs equally; the right is raised a little more, and it is also carried a little further forward than the left, which makes the action a pace, and not a leap. During this first elevation, and in some instances preparatory to it, the right or off-hind foot moves slightly forward, but only sufficient to gain a true centre, and to correspond with the increased forwardness of the right shoulder: the near hind leg, it must be remembered, yet remains fixed. The fore extremities now reach the ground, the near fore a little before its fellow, the off fore doubling over it, and placing itself a little beyond it; and the slower is the gallop, the more considerable will be the distance between the placing of the fore legs. As soon as the near fore leg has met the ground, and before the off fore has yet taken its full bearing, the hinder legs are moved in the following manner: the near hind elevates itself, and, as it reaches the ground, the off hind passes it, and becomes placed also. It is now that the horse begins to be *all in air* in this pace; for on the next spring that the hind quarters make, the fore quarters being already elevated from the last impulse, the animal is, of necessity, completely detached from the ground. The next period when he is likewise so, is when the fore quarters, meeting the ground, gain a new impulse by their rebound; the haunches are again thrown in to take their share, and likewise to give their impulse.

The *Canter.*—Whereas, in the gallop of speed, the legs are simultaneous, in the canter they are directly the reverse; and whereas in the slow gallop there is a period in which the legs are *all in air,* so in the canter an essential difference occurs, for, I believe, at no period in this pace is the horse *all in air,* but has always a point of contact with the ground; and this I conceive to be the grand distinction between the canter and gallop. The canter appears to be conducted thus: when it is performed on the right, the horse commences by first placing his off hind leg a little beyond the other; at nearly the same instant he elevates the fore-hand, and places first the near fore leg on the ground; the off doubling over and beyond, is placed in an instant after it. In the next moment, the hind legs are thrown in, and, while elevated, the off fore leg becomes raised from the ground; but the near fore leg is not elevated till the hinder ones are replaced, and this, as remarked above, constitutes the grand difference between the canter and gallop. I believe this explanation of all the gallops, but particularly of the canter, is novel; but it is the result of close and continued examination of the subject. That there is a very considerable difference between these two latter paces, no one who is in the habit of riding, or who has any sensibility on a horse, can doubt. The sensation to the rider is as different as possible; and so is the action to the eye also. If this is established, it will call to mind that the whole weight of the body must at one time rest completely on the near fore leg; and that this does take place in the canter is evident from the effects observed: for it is a remarkable fact, though seldom observed on by writers, that in all cantering horses the near fore leg is more deteriorated, and exhibits more of the effects of *work* than the off; and I have constantly remarked, that three out of four of such horses as are confined principally to cantering, as ladies' horses, &c. become first lame on the near in preference to the off fore foot and leg: and this difference in the wear takes place usually in the degree in which horses are used in this pace. It also occurs, in a minor degree, where the hand-gallop is often practised, when there will generally be a superior tendency to wear discoverable in the near or left fore leg; because in leading, as is usual, with the right shoulder forward, in the moderate gallop, the near fore leg meets the ground first; and though as the impulse gained by the rebound elevates the near fore leg along with the off, yet they are not elevated precisely at the same moment; but the near fore dwells a longer period on the ground, takes an increased portion of weight, and acts as a centre of gravity longer than the off or right fore leg. Judicious horsemen, sensible of this, do not therefore permit their horses always to lead on the same leg, but frequently change the centre, and gallop, canter, and trot, sometimes with the right, and sometimes with the left shoulder forward.

Leaping is performed by a sudden extension of all the articulations of the hinder extremities immediately after they have undergone an unusual degree of flexion. This extension communicating its impulse to the centre of gravity of the body, the whole is projected forward with a velocity determined by the force applied and the weight of the mass. The projectile force depends on the proportional length and obliquity of the angles formed by the bones and on the strength of the muscles which act on them; hence becomes apparent, the absolute necessity that the hunter as well as the racer should be so formed behind as not only to present great strength with length, but also a certain angularity of the separate portions which compose the whole. Nevertheless, it does not necessarily follow, that a large horse only can take considerable leaps; for, *cæteris paribus*, small animals leap proportionally farther than large; for the projectile force impressed on two bodies being in proportion to their different magnitudes, their velocities will be equal, and the extent of the space through which they pass will necessarily depend upon their respective velocities. Thus a small horse with a light weight will frequently leap both high and wide; but from the greater extent of the angles in large animals, and the increased force obtained from larger muscles, it is obvious that a certain size is necessary to the hunter, to enable him to cover his leaps, and the necessity is increased if much weight is to be carried. The direction of a leap depends on the situation of the centre of gravity with respect to the limbs by which the impulse is given. Man and birds, having the trunk situated immediately over the impelling limbs, are the only animals that leap vertically. Hence, when a horse attempts a standing leap of considerable height, as a wall, high gate, &c. he raises himself almost perpendicularly, and the elevation of his body will always be found correspondent to the height of the object he is to leap over.

The *artificial paces* of the horse are of little importance to the sportsman. The amble, as is well known, is operated by a hind and a fore leg moving together, immediately followed by the same legs of the other side. This pace is not now cultivated artificially, but a few horses adopt it naturally. In the manege, airs or artificial paces, called *terre a terre*, *piaffe*, *curvetting*, *passaging*, &c. are still practised. Of all these, passaging only may deserve mention, as not only necessary in the charger, but it also may be considered as a useful appendage to the paces of every horse intended either for carriage or saddle.

SECT. VI.

CONDITION OF HORSES.

CONDITION, as regards horses, is a term conventionally well understood; but beyond the precincts of the stable, it is neither precise nor technical. The term, in common parlance, might be supposed to imply nothing more than the symptoms and appearances which usually betoken health. Thus, when a horse is in perfect health, he ought under this view of it, to be considered as in perfect *condition ;* and, on the contrary, when a horse is in any respect out of health, he should be considered as out of *condition*; that is, in a *condition* that neither fits him for perfect service to his owner, nor for perfect comfort to himself. But *condition* is used with a latitude of signification much exceeding this, and in its popular acceptation among horsemen is more comprehensive but less correct in its meaning. Thus a farmer rides a horse to market in full vigour; but from constant exercise, he is out of flesh, or from being exposed to the air, he may have a very rough coat. This horse, with the stabularian, would not be said to be in *condition*: and though he may be in a state to do every thing a rider ought to require of him, yet, if he should pass in this state into the hands of a dealer, he must make some material alterations in him before he, the dealer, will pronounce him *in condition*, or before he can expect to sell him as such. Having, however, passed through some changes in his appearance, and being now termed by the dealer *in condition*, he would yet be found by the horse amateur to want further alteration before he would be fitted to undergo severe exercise, or to be in a *condition* to hunt, or even to pace the road as a superior hackney. Supposing him to have undergone some further changes, still in this improved state, if he should pass into the hands of the turf jockey, his *condition* must again be somewhat altered before he can be considered as in *condition* to '*run*.' This conventional term, therefore, comprehends a variety of states and degrees; some dependent on the real necessities for alteration in the state of the animal, according to the several uses to which he is applied, and others founded on an artificial taste relative to his exterior appearance. Condition in the cart-horse would imply, with a healthy state of his hairy covering, fulness and rotundity of frame generally; by which his exertions in carrying loads or drawing weights would be assisted. In the racer, on the contrary, in the hunter also, and, in a minor degree, in every variety of horse used for quick motion, *fine condition* would imply a state the reverse of fulness and rotundity.

Condition must, nevertheless, embrace some common properties in all: it requires such a state of the body, both internally and externally, as fits its various organs to act uninterruptedly for the benefit of the whole; and thus much, it is evident is equally necessary for the heaviest cart-horse as for the fleetest racer: but in the lighter varieties, in addition to this, '*to be in condition*,' expresses a state favourable to accelerated and long-continued motion; produced by condensing the greatest possible quantity of animal fibre, particularly of pure muscle, into the smallest possible bulk; and of promoting the absorption of the useless and hurtful incumbrance of adipose and other interstitial matter, by which means we unite the grand desiderata of lightness of body with full strength and elasticity. This state, if accompanied with a sleek and healthy coat, may be considered as one of *perfect condition*; and it is in the attempts to produce such state, that all the art of *training* consists: but a total departure from Nature's rules by unnatural heat, deprivation of light, stimulating food, restraint from water, and excessive clothing, are not now, as heretofore, considered, even in our racing stables, as the means best calculated to promote these ends; on the contrary, the light of truth and of nature is forcing a ray through the almost impervious casements of these 'prison houses.' We must not, however, join in a popular outcry, and thereby stifle the experience of many years, and the evidence derived from that state of our racers which has enabled them to beat the stock from whence they sprang. Nature, as we have innumerable proofs, may be improved by art, as regards the powers of her creatures. Nature gives due capabilities for all such purposes as are connected with the preservation and the propagation of animals; and to these she confines her limits. The art of man now steps in: diverting nature from her course, he is enabled to enlarge particular powers, which he directs to particular purposes at his will; nevertheless, such inroad on nature is always found to be at the expense of some of the remaining qualities; and thus it is that speed in the race-horse is increased at the expense of the safety and duration of his progression. In the greyhound also the celerity has been improved by man, but scent has been withheld from the animal by nature, as the improvement gained its maximum. As the rapidity of the race-horse has evidently been increased by artificial means, we are now led to consider him altogether an animal of art, and as such we also consider him as one whose powers can only be kept up by a continuation of means not altogether natural. That condition, therefore, which results from what is called training, it is more than probable is essentially necessary to the speed exhibited by the British racer. To the endurance of it, it certainly is. We may, without doubt, improve on the training process, and simplify it to advantage; but there is little doubt that we cannot wholly dispense with the aids derived from long practice and experience. I shall first proceed to a consideration of that want of *condition* which may be viewed as the result of present disease, or of circumstances tending thereto; and afterwards shall touch on the process of conditioning the horse on his return from grass.

The *accidental causes of morbid condition* are various: a very common one is found in injudicious feeding, both as to quality and quantity. Any sudden alteration in the articles of a horse's diet will frequently, according to the term of horse amateurs, '*throw him out of condition*,' such as removing him from the grass field or the straw yard to a full allowance of dry hay and corn, with a scanty supply of water '*to draw up his belly*:' all which are perhaps done at once, without the smallest preparation. In these cases the alimentary canal, being hardly yet in a state of digesting capacity, suffers from the increased powers necessary to draw nutriment from substances which, although in themselves more nutritious, yet are, in this instance, less digestible than those before in use. Thence follows costiveness, heat, and thirst; as well as an unhealthy state of the coat, which stares and feels harsh and dry, being a necessary consequence of the ordinary sympathy between the stomach and the skin. A sudden remove from a generous to a poor diet is unfavourable to *condition* likewise; for in such case the chyle or nutritious pabulum from whence all the vital organs are recruited, and all the vital energies derive their vigour, cannot be separated in sufficient quantities: the blood thereby becomes deteriorated; universal absorption takes place of the softer parts, which produces lessened bulk; while a laxity of fibre in the remaining portions is productive of langour and debility. The quality of the food is also of considerable consequence to the *condition*. Mow-burnt hay, by exciting a partial diabetes, is very apt to '*throw a horse out of condition*.' Musty hay, and oats highly kiln-dried, have a very unfavourable effect on it also. The liquid aliments should likewise be attended to in a consideration of the *condition*. Mineral waters are unfavourable to it in most cases; although there is reason to believe that in some morbid affections they are salutary. Sea water may be considered in the same light; but a continued use of the brackish water found near sea-bathing places, is unfavourable to the *condition* of such horses as have not been accustomed to it: to which, in union with the bad care taken of them in most of the livery stables of the sea-coast bathing, I attribute the universal complaint of the ill condition in which they so frequently return from thence. Badly ventilated stables, excess of clothing, and deprivation of water, are also frequent causes of *morbid condition*, as I have often witnessed: for, in some of these cases, after a course of purgatives, followed by alteratives and tonics, has failed, the more simple means of succulent food, a proper quantity of water, a well regulated but perfectly cool stable, with a free access of air, and very moderate clothing, have created an immediate change. An inordinate quantity of exertion, particularly if continued unremittingly for several days, will often produce *morbid condition;* and this, in cases where the feeding has been, as supposed, equal to the tasks required. It is particularly likely to happen to young horses, and to such as have not been sufficiently prepared: in which cases, it is clear that the stomach, participating with the general debility, has a double task to perform in digesting a larger quantity of nutriment than usual, to make up the increased wants of the constitution; and thus the evil is increased by adding the further deterioration of this organ to the others. I know of no state of morbid condition which often proves so obstinate as this; and which is often found at last only to give way to a good salt-marsh run. Drastic purgatives, or violent remedies, as the mineral acids, when injudiciously continued, reduce the *condition* very quickly, and sometimes irrecoverably. Another principal cause of want of condition is, the alternation of heat and cold. A sudden check to the natural or acquired heat of the body, particularly if aggravated by the evaporation of a perspiring state, and great previous exertion, as a sudden check after a severe burst with the hounds; this, if it should not bring on topical inflammation of some vital organ, yet frequently acts on the outer coverings of the body: the capillaries of the skin appear to become constringed, and the unctous matter secreted by the sebaceous glands seems either vitiated or lost, by which the elasticity and pliancy of the hide become lessened, and the hair, instead of lying smooth and appearing glossy, for want of the unctuous secretion becomes elevated, and feels hard and dry to the touch. The dandriff, or scurf, adheres closely to the skin, instead of separating and falling in daily scales, and adds likewise its share to the general derangement of the outer expansion. I have already alluded to that consent of parts which is so apparent between the skin and the digestive organs, and that it follows, in almost every instance, when one of these becomes affected, the other takes on a morbid state also. From much observation, I am disposed to think, that the sympathy between the skin and alimentary canal is so intimate, that they change the order of attack as circumstances occur. Thus, when the skin is primarily affected, the stomach becomes secondarily so, and *vice versâ*. In the application of cold to the surface, it appears clear that the primary cause originates with the morbid attack on the skin; and when we consider the structure and functions of this investure of the body (see *Skin*, in *Splanchnology*), we need be at no loss to account for an inelastic or *binding* feel of the hide, as one of the distinctive marks of *want of condition*. *Hide-bound*, it may therefore be inferred, is not to be considered as being in itself a specific disease; but, on the contrary, as a symptom only common to any state which deranges the secretory, and perhaps also the excretory, functions of the skin; and it thus accompanies, by a common consent of parts, most chronic affections of long standing. A long-continued gleet from the nasal membranes in glanders will produce it; a local attack of farcy on the hinder extremities brings it on; and the integumental affections of cracks, grease, and mange, claim it as a companion also. In fact, any means which are capable of producing an absorption of the cellular and membranous medium between the skin and muscular expansion, by which its motions are regulated, binds it down so firmly to this fleshy pannicle, as to confine its extension and destroy its usual elasticity.

The treatment of hide-binding must necessarily, therefore, blend itself with the general treatment of *morbid condition.* The *primary* affection of the skin is not always, however, confined to an inelasticity of the hide, nor to the staring of the hair upon it: for sometimes, from a kind of reaction, and inflammatory process in the deranged and obstructed vessels, small tumours become formed, generally extending pretty universally over the skin; which affection has received the name of *Surfeit,* and is often erroneously considered as a distinct disease, although a symptom only, being generally dependent on a primary affection of the skin. In a few instances I have, however, traced its origin to a deranged state of stomach, brought on by eating noxious vegetables, and, in some other instances it has been produced by the musty quality of the hay used. *The treatment of surfeit,* as well as of hide-binding, must therefore follow the principles applicable to *ill condition* in general.

Moulting, though a natural process, yet frequently produces much derangement in the system, and thereby affects the *condition* often. This is usually more sensibly felt at the autumnal than at the vernal shedding; for the production of a long coat must naturally call forth more powers of the constitution than a short one. During the process of moulting the vessels of the skin are in a state of increased action, for the purpose of forming a new growth of hair; and, as such, all the effects of slight fever are present. Horses are then weak, sweat easily, are chilly, suffer from thirst, and are irritable and low. Moulting, therefore, more or less, puts every horse out of condition; and in the early part of the hunting season, the inconvenience of this is severely felt. At such times, it is prudent not to dress horses much, particularly with the curry-comb, that the old coat may not be too quickly forced off, before the other is ready to replace it. Warmth, both in the clothing and in the temperature of the air, is salutary. Plenty of tepid water should also be given; the exercise should be moderate, and the food liberal, but by no means too heating; succulent food, carrots, potatoes, &c. may, therefore, with propriety, alternate with the corn given at these times. The cases in which a *defective condition* is primarily seated in the alimentary canal have been already hinted at. It may be further remarked on it, that here also some symptoms are mistaken for original and distinct diseases; among which stands the old affection of the mouth, called *lampas.* (See *Diseases of the Alimentary Canal.)*

Lampas is a symptom of that derangement of the stomach, and its recipient passages which sometimes follows, and sometimes precedes, the binding of the hide, an unthrifty and staring coat, &c., &c. *Its treatment* must, therefore, fall under the remedial plan detailed for the removal of morbid condition.

Ragged teeth.—Not unfrequently, in old horses, the teeth become unevenly worn, and now and then actually decayed; in which cases, as they grind the food less minutely, so they rob the animal of a portion of his nutriment, and thus injure his *condition.* (See *Teeth and their diseases.)*

Crib-biting.—This likewise sometimes proceeds from a deranged state of stomach, and is, therefore, a frequent, though not a constant, companion to the other symptoms of defective condition. (See *Crib-biting.*) The morbid change which takes place in the alimentary canal in the state called '*out of condition*,' is not sufficiently defined; and whether it be a diseased state of structure in its surface, or whether it arises from a vitiation of the secretions of the parts, is not altogether clear. If we argued from some appearances which occur, as the swollen state of that cuticular portion of the alimentary canal which lines the mouth, called *lampas*, and the thickened state of the cuticle of the tongue also, we should be led to infer a diseased alteration in the cuticular lining of the canal throughout. I have also observed, in two instances which occurred of horses having been accidentally killed, both of which were very much out of condition, that the cuticular portion of the stomach was relaxed, and streaked with inflamed marks, nor was the secreting or villous portion without some marks of affection also. On the contrary, in crib-biting, which is evidently an eructation of a small quantity of gas, I should, reasoning analogically, be prompted to believe that the secretions themselves might become vitiated, and that this affection, as well as some other of the symptoms of morbid condition, were purely dyspeptic, and dependent on an altered state of the gastric secretion.

Worms within the stomach and intestines, but principally the latter, will often injure the *condition* and produce irregular appetite, costiveness, with a mucous covering to the dung-balls when they pass, and a staring coat.—See this subject under the head *Worms*.

The Treatment of Morbid Condition.

From what has been said, it will be evident, that, as many different circumstances may produce defective condition, so it would, in every instance, be favourable to the removal of it, were the exciting cause clearly ascertained; for to that we should direct our principal attention. If it were purely local, for instance, as arising from impure air, or bad water, musty oats, mow-burnt hay, &c. &c. such causes must be immediately removed. When the case is more constitutional, internal remedies, acting on the alimentary canal, afford the most ready and certain means of relief. When the *morbid condition* is consequent on an attack of cold on the skin, whereby the capillaries suffer a sudden translation of their blood into the interior of the body to the evident injury of the organs, thus congested by these means, the remedial plan is still best promoted by stimulating the stomach into a sympathy with the exterior surface. Nauseating medicines in the human most readily affect the skin, and relax it into a moist, perspirable state; but as there are very few drugs capable of nauseating a horse, and still fewer that will do it mildly, so our dependence on antimonials, to benefit the skin by this particular state of the stomach, is lost: yet experience teaches us still to rely on them to act favourably on the surface, by other stomachic agencies than direct nausea. For myself, I feel more and more assured, that in many cases of morbid condition, but particularly in such as are accompanied with thirst and evident derangement of the stomach and bowels, betokened by irregular appetite, lampas, &c., antimonials are highly beneficial. They are equally so in most cases of constringed skin or hide-binding; and still more so when it is affected, as in surfeits, with either small bumps or swellings, or partial detachments of hair. Antimony received into the blood may relax the vessels themselves, and those of the extreme surface in particular, without disturbance to the stomach, overlaid, as much of it is, with cuticle: certain it is that, in the above cases, the effect of antimonials on the skin and hair in particular, as well as on the other symptoms of morbid condition, are often striking. In some instances, as in those strongly marked with atony and emaciation, the tonic effect of mineral agents, of astringent bitters, spices; and in others, of the more diffusible stimuli of ale, malt, barley, oatmeal gruel, &c. &c. experience proves to be the best adapted to promote the desired end.

But to proceed with this important subject with some regularity, I would direct that in young plethoric horses, with much flesh on them, and which are, of all others, the most subject to take on this state of *morbid condition*, that one or two moderate bleedings may be premised, particularly in such as have been full fed for some time previous. If the inner surface of the eyelids, or of the nasal membranes, shew any tinges of red, it is still more necessary to bleed; and in such case I would repeat the same with moderation once or twice more, or until this inflammatory appearance should be removed. I have found this, united with mashing, in many instances sufficient to relax the hide and reduce the rugous tumefaction of the lampas. In most cases, however, some more active internal remedies will be found necessary with a young and plethoric patient: thus one or two very mild doses of physic, preceded by a nightly mash, into which ten grains of submuriate of mercury (calomel) has been mixed, are proper. If there be joined to the affected hide, and the swollen or clammy mouth of lampas, any eruptions on the skin, or any cracks of the heels, stable soiling, or even daily turning out to grass, are advisable; but as these cases usually happen when the animal is either at present wanted, or is intended soon to be used; so I have not mentioned *turning out* altogether; yet, if these appearances prove obstinate, such a course will be advisable, provided the season and other circumstances are favourable to the proceeding. But when neither the partial nor total turning out to grass is convenient, and when soiling is likewise not practicable, still the use of carrots as manger food can be resorted to. See the article ***Feeding***. To this treatment may be added, after administration of the physic, a nightly alterative. (In thus recommending carrots, soiling in the stable, partial or total turning out to grass, &c. for an ill-conditioned horse, I shall startle the systematic trainer, who will perhaps exclaim, What can these have to do with *condition?* But I would request such to consider, that I am here treating of an actual state of *diseased condition*, which must be first removed by a regular medical plan of treatment, before any efforts can prove successful in promoting that *artificial condition* so much desired by him, and indeed by most amateurs of the present day). Either of the following formulæ may be tried, as best suits the veterinarian's views of the matter.—(See also *Alteratives*, in *Mat. Med.)*

Crude antimony	of each two or three drachms.
Supertartrate of potash *(cream of tartar)*	
Nitrate of potash *(nitre)*	

Or,

Supertartrate of potash	two or three drachms.
Nitrate of potash	ditto.
Powdered Sulphur	half an ounce.

Either of these will gently stimulate both the stomach and kidnies, and produce, by consent of parts, a favourable effect on the skin, and hair also. Violent diuretics are never advisable; nor have I seen their mildest form, unaccompanied by other remedies, produce much good, unless there have been, in addition to the other symptoms, swelled legs, either with or without discharge.

When *morbid condition* arises in such horses as, from age, previous deprivations, severe work, long confinement in bad stables, or feeding on unwholesome provender, are not to be supposed plethoric; even then, if no actual debility is present, I have often derived great benefit by commencing the treatment with a very mild dose of physic, the horse being previously fully mashed, to make a small quantity of aloes sufficient; for I have generally found that the stomach tonics to be afterwards administered have had double effect from this previous preparation of the alimentary canal. But where the debility has been extreme, or where there has been already sufficient laxity of bowels, or perhaps even superpurgation from drastic physic, begin at once with either of the following tonics, or of any of those detailed under that head in the *Materia Medica*:—

Socotrine aloes, in powder	one drachm.
Winter's bark, ditto	two drachms.
Ærugo *(verdigris)*	one drachm.

Treacle or honey to form a ball.

Or,

Oxide of arsenic *(arsenic)*	eight grains.
Pimento *(allspice)* in powder	one drachm.
Extract of gentian	half an ounce.

Make into a ball with liquorice powder. Or,

Sulphate of copper	a drachm and a half
Sulphate of iron	ditto
Powdered ginger	a drachm.

Horse turpentine to form a ball.

Either of these formulæ may be given some time in each day, at the convenience of the practitioner or owner. It would, however, where practicable, be more prudent to let it be given in the morning, fasting, allowing the horse but a handful or two of hay for an hour after its exhibition. If a liquid form only can be got down, either of the above mixtures may be dissolved and horned down as a drink with ale; but active mineral agents seem to produce their effect best in mass. In all cases of *morbid condition*, marked with emaciation and debility, a full allowance of carrots is advisable; and in default of them, or alternating with them, malt mashes or speared corn may be usefully brought in aid of the other tonics.

The essentials of the common cases of morbid condition, as far as regards their immediate medical treatment, are comprised in what has been already said. More may be gained by a reference to the numerous articles connected therewith: that which relates to dieting, to stabling, clothing, exercise, &c. proper in these cases, may be gained from the subject which immediately follows. I have here to add, that, as a topical auxiliary remedy, I have derived great benefit, in cases where the skin has been peculiarly hard, dry, and scurfy, but particularly where the hair has fallen off in patches, as after surfeits, &c. from the use of powdered sulphur mixed with oil, and rubbed well into the skin every other day for a week. I shall now proceed to give an outline of the principles of what is termed '*getting* (a healthy horse) *into condition;*' or, in other words, into that state which fits him for useful purposes on his removal from grass.

Getting a Horse into Condition.

When a horse returns from grass, or straw-yard, both his external appearance, and the internal state of his body, in general, require considerable *alteration* before he can be said to be fit for the uses to which he is applied by man. These alterations are properly called '*getting a horse into condition;*' and as the exertions required of him are ordinary or extraordinary, so the condition into which he is to be brought is more or less artificial. It is evident, therefore, that no precise rules for the purpose can be expected here, where principles alone are professed to be taught; and, indeed, were it otherwise, from the simple treatment of the ordinary hackney, to the discipline of the training stable, the grades are so numerous and diversified, that no common limits would suffice for their detail.

The alterations in the frame required by condition, have already been stated to be, the removal of all unnecessary interstitial matter, by which the animal fibre becomes more condensed, and all interruptions to progression being now removed, the motions are accelerated, the lungs are allowed to expand, which enlarges the measure of the wind; and the stimulating nature of the food gives courage and durability. To promote '*condition*' in a horse from grass, his dieting and watering, the temperature to which he is removed, his clothing, grooming, and exercise, are the circumstances particularly to be attended to. Physicking is also an usual and necessary appendage to the other parts of the treatment.

Dieting.—It would be most imprudent to take a horse from so moist a food as grass, and at once to place before him hay and corn without caution or limitation. Coming from a straw-yard, this restraint is not so imperative; yet even in this case, little corn should be given at first; but following the removal from grass, both corn and hay should be allowed but sparingly, particularly the former. The hay given for the first two or three days should likewise be moistened, by sprinkling it with water; the corn allowed should also be mixed with bran, by which the dangers of constipation and repletion may be avoided. The constipating effects of the removal from a moist to a dry course of feeding may be further obviated by a nightly bran mash. The bran mashing may likewise be extended to twice a-day, or until the bowels be somewhat relaxed, if the horse be very full in flesh, or have his skin at all tight, or eruptive, or if the legs be inclined to swell. In all which cases it likewise tends to shorten the process, and prevent that almost irrecoverable hide-binding which often follows these appearances, if succulent food, particularly carrots, be mixed with, or even wholly substituted for hay. The privation of grass renders it prudent that water should at first be given in sufficient quantity; it is, however, often withheld, with a view to harden the flesh and get up the belly: but which treatment is erroneous, and by exciting heat, thirst, and indigestion, frustrates its own intention. The *temperature* into which the newly stabled horse is removed, should not first be much increased beyond that to which he has been so long accustomed, or the sudden change may operate unfavourably on his lungs; and if it do not produce inflammation, it may at least occasion roaring, or broken wind. The most prudent plan is, first to place the horse in an airy box, which will not only prevent too great heat, but also obviate the danger of swelled legs, and heated feet. By degrees, so much increase of temperature may be kept up, as will promote the fall of long hair, or the retention or renewal of the short: and in the degree to which the artificial coating is wished to be carried, to that degree should a temperate or an ardent climate be imitated. The *clothing* and grooming should, like the other parts of the conditioning treatment, be at first very moderate: the one produces extra heat, the other extra irritation; but by degrees both may be increased according to the views of the owner, or the purposes of the horse. ***Physicking*** is found to assist the *condition* of horses; for by emptying the bowels thoroughly, absorption of the extraneous fluids is promoted. One, two, or three doses, according to the extent to which the condition is intended to be carried, are usually given to every horse, where this process is conducted on the usual principles; and are certainly necessary, wherever continued and accelerated exertions are required. See ***Physicking.***—***Exercising*** a conditioning horse, like the other aids, must be done with a due regard to circumstances. At first, walking alone best answers the purpose, and twice a-day is better than once: the duration of each walk must be regulated by the age, the fulness of habit, &c. &c. As the condition improves, trotting and gallopping may be employed, to benefit the wind, draw up the carcass, and accustom the horse to full work. It may be here remarked, that I have seen all attempts to promote condition fail in a horse removed from an old companion, or when stabled alone. Horses are gregarious, and often bear segregation badly: such a case can only be treated by association.

SECT. VII.

STABLING OF HORSES.

The Stable itself.

I HAVE, on this subject, avoided all topics but such as are directly connected with health, and which consequently fall within the province of the veterinarian. Other matters, which properly belong to the groom, are purposely omitted, as foreign to the intention of the Work. The stabling of horses, as it is wholly a deviation from nature, so it paves the way for the attack of disease; and the higher this artificial system is carried, so much the more is the liability incurred. A stable should, therefore, be regulated on principles which, at the same time that it confines the animal, yet allows of the free use of all his functions. One of these principles, and one in general too little attended to, is to have it sufficiently airy although moderately warm. It is justly supposed that warmth is congenial to horses, particularly of the blood kind, as being originally natives of a warm climate; but this opinion may be carried too far, for we must be aware that the horse is native to all temperate climates, and therefore it may be supposed that continual crossings have altered much of the original exotic peculiarities, and have fitted this animal for an extended residence. We may with propriety allow something more for the full blood horse, which does not bear the abstraction of due warmth with equal impunity as those of a more mixed breed, and yet it cannot be denied that some of the best bred horses are occasionally seen in the most degrading servitude, and exposed to scanty fare and wretched housing, as though they had wholly lost their exotic dependencies. Our game fowls, although original descendants from the poultry of the east, are now indigenous and equally hardy with any other of the feather tribe. The beautiful camelia japonica, which a few years ago would live only in a green-house, succoured by artificial heat, will now bear exposure to the rigours of a British winter without doors: and the blood-horse, or eastern variety, experience shews, does not require more heat for the *simple* purposes of life than any other. We say simple, because, as it may possibly be argued, that greater warmth is necessary to the forced condition of the racer than to any other variety of cultivated horses, yet even this would not invalidate the assertion that to overheating our horses much injury results. We have ample proof that to confined stables, where the same air is re-breathed over and over, and where the enervating effects of unnatural heat are always present, we owe many of the diseases which swell the veterinary catalogue, and which is fully proved by the trifling ailments which befal those that are seldom or never confined. It is well known, that since the full ventilation of our cavalry stables, inflamed lungs, grease, and glanders are infinitely decreased. Are not the animal inhabitants, of almost every description, of the east confined in their bulk? and if not equally confined in their energies, are not their lives shortened by the agencies of a torrid zone? and can we expect our own animals to ripen into bulk, to foster into strength and activity, and to push life to its utmost verge by the self same means (unnaturally applied also) which retard it in other climes? Is it not alike repugnant to judgment and experience to expect to keep animals in health that, from stables heated to more than sixty degrees, and warmly clad also, are first stripped, and then at one exposed to a temperature at the freezing point?—and yet such is the daily fate of thousands of our best saddle and carriage horses. It will, perhaps, be argued, that exercise makes up with them the deficiency of the heat and clothing they have left; and such might be the case, were they to be constantly in exercise when out: but how often do the finest carriage horses wait for hours exposed to the cold? how often are horses bathed in perspiration seen loitering, while the hounds are retrieving a lost scent? Nor are saddle horses, however valuable, exempt from the same treatment. If it be granted, that this unnatural heat be not necessary to the well being of the health of even the full-bred or eastern variety of horse, now he is domesticated with us, what benefits, it may be asked, are really gained by the continuance of this system so obstinately persisted in? To this query, the only reply that presents itself is, that the benefits gained, appear to be the satisfying a sophisticated taste for an appearance wholly unnatural to the animal. It is contrary to nature to expect or desire to see a horse with a perfectly sleek and glossy coat in winter in any clime, but in our own particularly: for here Nature provides specifically for the rigours of her wintry blasts, by giving a long warm exterior covering: to avoid which provision, we invert her order, and keep up a tropical climate by heat and clothing; under which treatment, the constitution, not being subjected to the stimulus of necessity, provides a covering suited only to the climate the stable represents. But when they are removed from this unnaturally heated temperature, and enter on their work, it is evident they at once enter a new climate, rigorous in itself, and rendered still more so by being forced into it naked and deprived of both natural and artificial clothing: under which treatment, can it be wondered that they become subject to disease? and that they are not still more so, is attributable only to that wise provision of Nature in giving capability to resist ordinary changes of temperature; but this capability being unfortunately not always present, as in debility, constitutional predisposition, &c. the worst consequences often ensue.

The *heat* of a well-regulated stable should be graduated by a thermometer, for our feelings are but a feeble guide to our judgment in measuring temperature. It would be well that the stable heat should seldom reach, but never exceed, 55 degrees of Fahrenheit in winter, or 65 in summer. In racing stables Darvill recommends 62 degrees as the winter maximum, and 58 to 60 degrees as the winter maximum in the hunting stable. The best hacks require about the same temperature; at least such is usually the warmth kept up for their respiration. To renew the air, every stable should be well ventilated; and such ventilation should be as near the ceiling or top of the stable as possible, as the impure air ascends. The ventilators sometimes seen, which revolve quickly on their own centres, are not, I think, good, because they occasion a draught of air; for which reason likewise windows should be so constructed as not to open directly on either the front or rear of the house, but their opening should be so managed that the current of air received should be directed upwards towards the ceiling. Thus formed, they admit air, but without any strong current being directed on the body of the horses. We have in our own stables encouraged free ventilation by means of one or more tubes or funnels, according to the size of the stable, let into the ceiling, presenting below a larger end of twelve or eighteen inches square, which, as it ascends, narrows at its summit to about four or five inches; and then passes out at the roof of the building, having a raised cup over its top to prevent the wet from descending. Light appears essentially necessary to a stable: the exit from a dark one must be a painful stimulus to the eyes of the horse, and his imperfect vision makes him startlish and irritable. Dark stables are supposed to encourage feeding; and it is not impossible but the horses of eastern countries eat most during the night. It also, it is thought, induces them to lie down more. The greatest encouragement to the latter is a loose box, and to the former air, exercise, and soft water. Stables should be well ceiled, and that very closely: when this is not the case, not only does the dust from the hayloft fall on the horse, but it frequently enters his eyes; and the impure air, composed of nitrogen and ammoniacal gases, which always ascends, lodges in the hay above. In fact, it would be better that both the hay and corn should be altogether removed from the sphere of action of the ammoniacal effluvia of the stable, and be only brought to the animals as they are wanted. Partial draughts of air in a stable should be carefully avoided, as extremely injurious to horses: a very lofty ceiling without an upper story is the best preventive to this. Narrow stalls are also very prejudicial to horses; strains in the back are often occasioned by them; and whenever a stall is less than six feet wide, the groom should have peremptory orders never to *turn* the horse out of it, but always to *back* him out. Bars or bails are also objectionable, from the ease with which horses may play with and kick each other over them, and likewise because it is seldom that horses eat alike in point of quickness; and thus, when they are separated by bars only, the slowest eater gets robbed of his food.

The acclivity of the generality of stalls is also a very serious objection to them, for they occasion a horse to stand unequally, and an undue proportion of weight is thrown on the hinder extremities: the declivity also puts the flexor tendons of both the hind and fore legs on a continual stretch, and by it, probably, many horses are injured. The smallest possible slope only should be allowed: neither is the central grating a remedy for this inconvenience; for it not only is useless as regards mares, but it is rather injurious, because it retains the urine, which thus continues to diffuse at every moment the effluvia it should be so much our study to avoid. It is much better that each stall should be furnished with a grating placed over a small drain at the foot of the stall, which should be so constructed as to carry off the urine or washings from each horse into one common out-door cesspool, so perfectly secured against the access of the external air, that injurious exhalations may not pass up through the gratings.

There is much contrariety of opinion relative to the propriety of permitting horses to stand during the day on litter; and there are cogent arguments for and against it. Litter entices horses to lie down even during the day, which relieves fatigue, and is consequently favourable to the recovery of over-strained limbs; it also prevents an uneven or hurtful pressure on the feet when it is cobble-paved. On the other hand, gross feeding horses are apt to eat their litter, which is not desirable. It is, likewise, too apt to retain the urine, and thereby to generate the acrid salts we have described. Constantly standing on straw makes many horses' legs swell, which is proved by removing it, when such legs in most cases immediately return to their proper size: the warmth and moisture retained in it, likewise, are very apt to occasion cracks and swelled legs. Litter retained, is probably injurious to the feet also; for if horn has a tendency to contract by the application of heat, the horn of the feet, being placed so many hours within it, must be subjected to this additional stimulus to contraction. In my own stables no litter is ever suffered to remain under the fore feet during the day: on the contrary, the horses stand on the bare bricks, which in summer are watered to make them more cool. Behind, a little straw is strewed, because horses are apt to kick and break the bricks or disturb the cobbles with their hinder feet, and because, when no gratings exist, or no slope is present, the litter thus placed sucks up the moisture of the urine, which would be detrimental to the hinder feet, which are more liable to thrushes than contraction. A moveable manger is a preventive to the taking on the habit of crib-biting and wind-sucking: sloping racks are also injurious, by encouraging the fall of hay-seeds into the eyes, as I have seen happen frequently. Hay-racks should, on the contrary, be upright, and by no means so much elevated from the ground as they usually are: by this undue elevation the horse's neck is put continually on the stretch; which being a total departure from the natural posture in which the horse seeks his food, is likely to be punished, in common with all artificial habits, by congestion of the head, or other ill consequences.

The *box* is a necessary appendage to every good stable; indeed it may, with great propriety, form a part of the stable; and I would advise that, whenever a new one be erected, so to frame it, that every standing may, by having a moveable partition, be readily made into a distinct and separate box. It would be well were in-door horses more generally accustomed to spend their leisure time in boxes than stalls: boxes are advantageous to the jaded horse, by encouraging him to lie down during the day: they are advantageous to the idle horse, by encouraging him to exercise himself. By means of boxes, the evils of long frosts to the hunter are avoided; and the unrestrained enjoyment of freedom is relished by all. A loose box wholly unconnected with the stable is also a valuable appendage to a gentleman's establishment: it may thus with impunity be the receptacle of a contagious case. The detached box should be so constructed as to be capable of being cooled to nearly the temperature of the external air, or, when necessary, to be made as warm as requisite for some cases of sickness. No projections should be allowed in its walls to hurt the hips in cases of falling from weakness, staggers, &c. It should, also, have a grate in the centre communicating with an outer cesspool, with a general slight bearing of the flooring to the grating: into a large box of this description every horse taken up from grass should be first put, to prevent the access of the worst colds to which horses are liable, which are those caught on the sudden remove from a cool into a heated temperature.

The *summering of hunters* seems so connected with the subject of boxes, as well as with the health of a most valuable variety of our horses, that I feel constrained to take some notice of it in this place. Of late years our sporting works have teemed with conflicting testimonies in favour of opposite plans of *keeping hunters during the summer months.* The long practised method was, after some preparation, to turn them out to grass, there to remain until the commencement of autumn: and, without due consideration, no plan would seem so consonant with nature, and therefore none so likely to restore the overstrained organs to their original state. But a more critical examination of the subject, and the collation of facts, will perhaps set the matter in rather a different point of view. It has long been observed that a horse that has been stabled for many years, and then turned out to grass, seldom thrives; on the contrary, he usually loses flesh and condition, although the pasture in which he is placed may be of the most luxuriant kind. It has been noticed also, by intelligent trainers, that race-horses, after being turned out, never again fully recover that speed they had previously exhibited. It is likewise equally remarked on, that in hunters which have been completely summered abroad, it has been found very difficult, and often impossible, to restore them to their full condition until much of the hunting season has passed by. Neither are these facts at all irreconcileable with sound philosophy: a long course of artificial treatment, combining as it does an over-heated atmosphere, stimulating food, warm clothing, with the effects of exertions gradually forced on the animal, until they far exceed in intensity and duration the natural maximum; all these may, and certainly do, alter the constitution, by introducing new habits and new wants; and thus altered, the body cannot without much force, and without some injury, be again completely naturalized: on the contrary, that, being once fully subjected to this kind of domestication, it will not bear at the will of the owner to be let down and wound up again like a spring. But as it required much care and much artifice to mould the constitution and organs into a capacity for this unnatural condition, and these unnatural exertions; so it appears that it is only by a *uniform continuance* of the same means, that such condition and such exertions can be with certainty insured when called for by the owners. In other words, from the nature of the horse we now use, and what is required of him in following our present breed of fox-hounds, it is found best to preserve *through the summer* as much as possible of that condition for exertion which the end of the hunting season left him with.

It is said that the Earl of Plymouth first tried the plan of summering his hunters altogether within the stable, with little variation in their treatment; by which it is asserted their condition was fully preserved, and that, by this means, his horses entered on their hunting season in full '*wind, speed, and bottom.*' Others, to avoid this extreme, have soiled their hunters in the stable, or have given carrots; and some have gone a step further, and have pursued the in-door summering, not in stables, but in loose boxes. Still, in all these cases, regular *exercise* is required, or the feet must suffer, or the horses are apt to become pursive, thick-winded, roarers, or broken-winded; but be it remembered that, if such exercise is too severe, then the wear on the limbs continues the deterioration which the hunting season had brought on. But if a sportsman had one, two, or three hunters only, and would use them gently every day as hacks, he might then summer them in this way without injury, provided they had not suffered previously from strains or foot lamenesses; in which cases absolute rest would of course be requisite. It would, therefore, seem from all this, that a medium plan, which should combine the renovating effects of air, mild exercise, moisture to the feet, and the relaxant effects of grass, might be followed with much more propriety and hope of general advantage than either total turning *out* on grass, or total confining *within* on hay.

The *box summering of hunters*, in my opinion, is of this kind, and consists in allowing each hunter his liberty in a loose box, having fly wire casements and closed doors during the day, in which he is to be moderately fed with corn and hay. At night, unless it be stormy or very cold, he might be turned out into a small sheltered paddock which should afford only a short bite of upland grass, of which an acre is sufficient for each horse; but not more than two or three should be together, to avoid violent racing about amongst them, and other accidents. When the field is eaten quite bare, a similar plot may be substituted; but, in all cases, an open shed within each field, independent of the boxes, should afford a refuge against accidental storms and rain. At an early hour every morning the hunter should be taken to his box, from whence he is not again to come out until the evening, unless a very favourable gloomy day offers itself. Carrots may be substituted for part of the corn and hay with advantage in stable summering; which variation, and many others, will present themselves, and prove beneficial, when the true principles on which the subject should be considered form the basis of the determination. The treatment of the feet during this period must be regulated by circumstances: one or two quiet horses, used to each other, may be allowed to range together without removing the hinder shoes; but it is always a safer plan to take them off, unless the ground be very hard, or the box be paved. This latter circumstance can always be obviated, by allowing these boxes to be covered over either with tan, sod, or other soft matter: but boxes expressly built for this particular purpose would be better altogether unpaved; in which case, to avoid dust, and to keep the flooring cool, it might be moderately watered every morning. The fore feet may be tipped, particularly if at all inclined to contraction; or should they become hard, hot, and dry, such means must be made use of as the medical parts of the Work direct, under *diseases of the feet.* The general state of the horse ought also to be attended to, particularly his bowels, that they do not become costive; and the skin also, that it do not become hide-bound or eruptive, or that a short dry cough may not steal a march unobserved on him. The careful and intelligent groom must watch over the health of his in-door summered horses with vigilance, and alter his plan according to circumstances; but the still more prudent owner would do well to have them inspected weekly by a well-informed veterinary surgeon.

Of Horse Provender.

The *feeding of horses* forms the most essential part of their treatment, and falls necessarily within the province of the veterinarian; whose experience will teach him, that, from a non-observance of nature, and a want of consideration of the internal œconomy of the animal organs, many dangerous errors are committed in this essential matter, which it will be his duty to guard against and warn the attendants from. In the food of horses we are apt to locate our notions to the matters around us, without considering that every country has its peculiar products, from which the *materia dietetica* of horses are gained. In some very sterile countries, horses are forced to subsist on dried fish.; and in many others, *animal* matters are given as edibles—as milk in Arabia—flesh balls, eggs, broth, &c. in India, and other parts where a natural or accidental scarcity of proper esculent vegetable matter occurs. The food of horses may be divided into the natural and artificial, and also into the dry and moist; but the various matters composing it are best examined by considering them under the leading heads of herbage, green and dry; grain, and varieties; which latter are composed of substances that embrace the principles of both these, as pulse, roots, fruits, mixtures, and cooked or partially digested food. Of *herbage*, the principal is grass, of which many varieties are known among agriculturists; which are eaten by horses either in a succulent and moist, or in a dried state, under the name of hay. The principal hay food of our racers, hunters, and hacknies, is however formed from meadow grass, of which the upland is by far the best. Clover, rye, sainfoin, lucern, vetches or tares, and melilot, are also formed into hay for agricultural horses, or as a change for the others. Of these latter it is customary to form a stable food in their green state, which is called *soiling a horse*, and is found highly useful in cases of morbid condition, dry coughs, chronic affections of grease and farcy, &c. &c.; but great care is necessary to procure it fresh, and to prevent its heating. In France, Spain, and Italy, leaves of various kinds, as vines, limes, &c. &c. are collected, and given both green and dry. In Holland, a particular reed flag is used in the same way. In Hungary, the dyer's wood (*isatis tinctoria*) is used for horses; and as it affords three or four crops a year, it may be always collected fresh and green. In many parts of the south of Europe, the leaves and smaller twigs of the acacia are so employed likewise. In India, as the indigenous grasses mostly grow to an enormous height, and contain but little nutriment, so numerous other vegetable substitutes are made use of, the principal of which, however, are farinaceous. In many parts of the European continent, furze or whin is used, in districts where grass is scarce, and is found to form an excellent food both for horses and cattle of all kinds. It is usually prepared by crushing, and, when not so done, by degrees both horses and asses learn to do it for themselves with their feet.

Hay is *dried herbage*, made by cutting the various grasses, and occasionally other vegetable matters during their fruiting and seeding processes; when, being subjected to the action of the sun* and air a proper time, they are then collected into large masses called ricks, where a certain degree of fermentation takes place before the vegetable matter of which they are composed becomes wholesome or nutritious, or before it receives such alteration as fits it for resisting further decomposition and decay. The judicious management of this fermentative process, it is evident, must form a very important feature in agriculture. Pursued to a proper extent, the remaining moisture acting on the farinaceous parts, as the seeds, by the united aids of the external temperature and the internal heat evolved during the process, the whole mass is, as it were, malted, and sugar is produced. Pushed beyond this, the hay becomes carbonized or mow-burnt, its nutritious properties are lessened, and its noxious qualities increased*. Fortunately for agriculturists and their beasts, salt, sprinkled with such hay, renders it both palatable and innoxious. Many substitutes are occasionally used for hay: in our own country, wheat, barley, oat, rye, and other straws are used; but straw serves more to distend the stomach, and to mix with other matters, than to nourish alone. Horses will, however, when at rest, live on it. In some parts, dried fern, in others reed flags, dried leaves, small branches or twigs collected and dried, are so used. In the West Indies, the tops of the sugar-cane are stacked for the purpose; and the straw of the Zea maize, or guinea corn, is likewise so employed.

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* It is the opinion of some that the aroma of plants is dissipated by drying in the sun; and, as this aromatic oil forms a powerful stimulus to the stomach to digest the hardened substance, it would, in such case, be better were hay (whenever it could be done) made in the shade. It would probably still further add to its qualities, if it could be made wholly without light also. In preparing plants for pharmaceutical purposes, we have full proof that, thus dried, their active properties are greatly increased. Digitalis so gathered, is one-third stronger than when dried in the sun.

Horsemen are not agreed on the subject of the properties of hay as a food for horses; some holding it very cheap, others lauding it to the skies. If these animals can be supported by it, of which there is ample proof, it must have sufficient nutritious properties: but will it do so under great and accelerated exertion? The answer is, no. Hay, to support life even, must be taken in great quantities: much time must be allowed to digest it, and much water to furnish gastric maceration for it in the stomach. All these circumstances are directly against those uses of the horse to which luxury and the wants of commerce have applied him, particularly the lighter varieties. Among these, therefore, hay is more used as a condiment, or as we use our vegetables, to increase the bulk of aliments to a healthy distention of the stomach; and, as such, very little of it is actually necessary where horses are put to extreme exertion; for their artificial life appears best maintained by condensed nutriment, as grain. In some posting and fast-coach stables hardly any hay is allowed, as uselessly distending the stomach. These are the extreme cases: but the inference to be drawn is, that the uses to which we apply the horse will best dictate the quantities of either provender; bearing it in mind, that horses, like ourselves, vary constitutionally, some being more readily and more simply nourished than others.

The *grain* used for horses is of various kinds, and possesses different degrees of nutriment, according (as is supposed) to the various proportions of gluten, sugar, and farinaceous matter they contain: but a graduated scale of these components has not been found to throw much light on their relative powers of animalization; nor can the laws and phenomena of organic life be ever found to be satisfactorily accounted for on chemical principles. Grain seems peculiarly fitted for the support of those animals whose stomachs being small, muscular, and partly cuticular, approach the nature of the gizzard or food-pouch of the gallinaceous tribes. Such animals are hence called granivorous, in distinction to the graminivorous, or grass-eating, of which the horse family is the most prominent instance; and, although the vegetable stalk will furnish bare existence, yet it is from the nutritious qualities of the fruit or seed that he is best supported. In South Britain, *oats* are almost exclusively used as horse grain. Sir Humphrey Davy has, from analyzation, supposed them to contain 748 parts of nutritious matter out of 1000; and it is probable the proportions are justly computed. *Wheat*, which he states by the same inquiries to contain 955 parts out of 1000, capable of animalization, must, according to him, afford much more nutriment, which agrees with observation; but for obvious reasons it is seldom used for such purposes, except on particular occasions; and then generally as *bread*, in which form it is a most convenient condensed medium for recruiting strength, and peculiarly adapted for horses which are '*tired off their appetite*,' and whose digestions are weakened by over-exertion. *Barley* is more frequently given to horses than wheat; and according to the experiments of Sir H. Davy, it contains 920 parts out of 1000 of nutriment: it is, therefore, if the laws of organized life exactly tally with chemical rules, more nutritious, though less used, than oats: made into bread, it is sometimes given, and still more frequently it is used in the form of malt, where its nutritious qualities are heightened by the sugar evolved. Barley appears to have been the principal ingredient in the horse food of the ancients; and, on the continent, barley and straw are still very commonly made use of instead of oats and hay.

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* Mr. Clark has argued, that as the scythe knows no distinctions, so with the others some noxious herbs are levelled; and to this cause he attributes some evils in feeding on hay: but surely the ingenuity here is greater than the probable truth. The same instinctive powers of selection enable the horse to refuse that which is noxious, whether green or dry, as we see by his wasting particular portions of his fodder, and which are always selected portions—for no other well-fed horse will eat them.

In the West Indies, maize, or guinea corn, is likewise given to horses. In Holland, and many parts of Germany and Norway, buckwheat is made into a black bread, with which they are fed. On the use of grain as a horse provender among us, custom and experience have set their stamp; but there are some facts that the young veterinarian should bear in mind. All grain, when new, is less nutritious, and, like grass, is apt to scour: time corrects this; and thus oats and beans of some months old are are to be preferred to such as are new. When circumstances force new grain on us, its noxious properties may be avoided by heat: thus new grain should be kiln-dried before it is made use of. Oats also should be plump in the grain, heavy in the hand, and thin in the hull. For racers and hunters they should be well winnowed to free them from dust, and screened to clear them from the thin grains, loose hulls, and tailings. There are also other edibles that are used with advantage, particularly under certain circumstances, such as a necessity to relax the deteriorating influence of hide-binding.

Carrots stand foremost on this list, and hardly too much can be said on their excellent qualities. They appear particularly favourable to condition, as the skin and hair always look well under their use: they are highly nutritious, as we know from the fat accumulated when they are used. We do not, however, as some do, advocate their use for our hunters. In conjunction with bruised oats they agree well with all horses not employed on fast work. In the *Museum Rusticum* is an account of two hunters fed with carrots and small loaves made of barley and oatmeal mixed; and these horses were said to be the pride of the field. We are not prepared to deny this, but we should strongly object to ride a valuable hunter a sharp burst with a pack of well-bred foxhounds on such dieting as this. It is true that agricultural horses may be thus supported, or by sweet parsneps, Swedish turnips, and other edibles in which sugar abounds. Potatoes have likewise been successfully tried as food for agricultural horses, but they have been usually given cooked. *Fruits*, as gourds and sweet potatoes, in America; figs and chestnuts in Spain and Italy; apples in some parts of France; and numerous other fructified exotics, are occasionally employed also as food for horses.

Mixtures of several kinds are in use as horse food among agriculturists, and they possess many advantages. They are economical; they can be varied to every taste, and also to almost every purpose, whether cooling as an alterative, or stimulating as a tonic. Although *mixed food* is principally in use among farmers, post-masters, and waggon-keepers, yet it would be beneficial if its advantages were more widely extended. Among the mixtures which form what is called *manger-feeding*, one of the best is from a chaff composed of one part of the very best hay, and two parts of clean wheaten straw: to three bushels of this mixture add one bushel of bruised oats. It is of essential consequence that the oats be well bruised, not ground, but completely flattened by a proper machine made for the purpose. When whole oats are used, the grains are apt to slip between the chaff in mastication, and perhaps one half of it thus proves useless. If economy to the owners, and advantage to the animals, were generally studied, corn would seldom be given without being bruised. To horses under great exertion, the stomach must participate in the weakness of the whole, and such animals are often too much fatigued to masticate their food properly; but by bruising, the work is partly done for both organs. My experience among my own horses, and my inquiries among those to whom I have recommended the bruising their corn, convince me that one-third is gained by the practice*. Of the *mixed food* I have described, three, four, five, or six pecks may be given daily, according to the size of the horse and the extent of his exertion. In this manger feeding, little or no hay is requisite: by which means horses who work hard are enabled to lie down and rest, instead of wearying their already tired limbs by standing through half a night to eat hay. When the chaff used is made of clover instead of meadow hay, it proves more palatable to horses, and is thought more nutritious also: but for horses travelling quick, that with meadow hay is to be preferred. In very many cases of horses in moderate work, carrots thinly sliced with chaff may be substituted for corn, provided the quantity be doubled or trebled, and this with additional advantage to the health and condition of the animals in moderate work. These mixtures are particularly used in farm stables, with benefit to the horses and to the owners; but without bran they often prove heating and binding.

Cooked food is now much used by practical agriculturists for horses, and very favourable accounts of its advantages appear. The articles used are potatoes, turnips, carrots, and parsneps. To a weakened digestion arising from very severe work, food in sufficient quantities, thus already reduced to chyme without the labour of mastication, may be very important; and, as Mr. Curwen remarks, the time gained for rest by the use of this food is a very important feature in the plan. A horse, he observes, will consume nearly six hours in eating a stone of hay, whereas he will eat a stone of steamed potatoes in twenty minutes. It is also in favour of this food, that horses are almost always found disposed to lie down soon after eating it; the reason of which appears to be, that the sudden distention of the stomach disposes the horse, as it does all other animals, to sleep. The use of salt, as a condiment to the food of horses, as well as of horned cattle, is every day gaining ground. In France and Switzerland it is now very generally employed: for riding horses, three or four ounces per day are mixed with their food: and for large draught horses five or six ounces. The animals become extravagantly fond of it, thrive well, and are freed from much of their liability to disease by its means.

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* The good effects of bruising of oats are well exemplified in a letter from an intelligent officer in the India service to J. Curwen, Esp. M.P., published by him in his Treatise on Live Stock. During a season of extreme scarcity in India, it was the custom of the famine-hunted wretches to follow the English camp, and to draw their principal subsistence from the grains of corn extracted from the excrement of the horses. So little comminution do those grains suffer which do not pass under the teeth, that they vegetate afterwards readily. Some birds, we know, draw a great part of their subsistence from grain extracted from dung.

From the foregoing examination of this matter, it may be gained, that, by following the dictates of Nature as closely as circumstances will allow, we shall best fulfil her intentions in the preservation of the animals entrusted to our care: but it must not be overlooked, that art must also be counteracted by art; and, as luxury and commerce have introduced artificial habits and exertions, as well among our animals as ourselves, so these must be taken into the account. It is one thing to argue on the requisites to keep horses in health simply, and another to describe the processes by which they are to be enabled to undergo services to which, in a state of nature, they are never likely to be called. Commensurate with their exertion, therefore, must be the food given them, both in quantity and quality. If the work be simply laborious, all that is requisite is, that the food be sufficiently nutritious: the bulk whereby such nutriment is gained, is not a matter of import; but if such exertions are to be combined with accelerated progression, as in our racers, hunters, &c. &c., it is evident that such feeding is best adapted to the end required which contains much nutriment in the smallest space, which increases the durability, or aids by bracing the animal fibre, and heightens courage by increasing the nervous irritability. Such intentions are found to be best fulfilled by a full allowance of old grain, in preference to any other mode of feeding at present known. It remains only to add, that, although experience has fully proved this, in all cases where the exertions are extreme; yet that it has also occasionally led to another evil, by introducing a plan of treating all horses of value alike. Thus, most of the hacknies and the carriage horses of the wealthy, &c. are accustomed to be fed, not as though their exertions were moderate, but as though they were unceasing; to the great injury of themselves, and to the destruction of a vast quantity of valuable corn. To thousands of such horses at least one-third of their hay and corn, particularly the latter, might be advantageously abstracted: this opinion is not lightly formed, but is the result of many years' observation, experiment, and inquiry.

Watering of horses is a part of their dietetics that is not of trifling import. All horses prefer soft water, and it proves the most wholesome; indeed, so partial are they to it, that a muddy chalky pond is an irresistible lure to every horse. It is not a good custom to warm the water generally for horses: but it is still worse to give them water just drawn from a pump or well; and particularly in summer, when such water is, comparatively, colder than in winter; and when the horse is probably much hotter from exercise, clothing, &c. As some horses drink quicker than others, it is more proper to give them their water in the stable than at a pond, where they often drink immoderately. The quantity given should be regulated by the heat of the weather, the perspiration brought on by exercise, the nature of the food, &c. &c. Under severe exercise, more is always required, and in summer also. In common cases, a large horse requires rather more than the half of a large stable pail, and that twice in the day: at night a full pail should be allowed, making in all three waterings. It is erroneous to suppose that abstinence from water increases the wind or vigour; on the contrary, many diseases are encouraged, particularly inflammatory ones, by this deprivation. If it were the custom to place water within the reach of the animal, he would be found to drink more frequently, but less freely, than when watered according to the usual method. Restraint in this particular, when journeying, is barbarity itself; and is fatal to the appetite, to the spirit, and to the temper of the animal. Horses should never be gallopped after drinking; it is the frequent cause of broken wind; nor should they have much water given before eating: but on a journey, when the animal is very thirsty, give three or four quarts; then feed; and when the food is partly eaten, allow a little more; and afterwards the remainder of the quantity intended, which in hot weather should be liberal. A necessary caution is, that after exercise the horse be brought into the stable cool. It is to be remembered, that passing from a cold atmosphere into a warm one will give cold, with almost as much certainty as removing from a warm into a cold situation. But when, unavoidably, a horse is brought home very hot, he should not be hung, as is often the case, by the bridle at the door till he get cold; he should, on the contrary, be walked about until he has become cool. The legs, in very dirty or cold weather, may be with propriety washed within the stable; but, unless they be rubbed dry afterwards, it would be far better not to wash them at all. In cases where fears are entertained on this head, it is a safer plan to rub off the loose dirt with a very soft broom, and then to wisp them till dry; after which it is proper to rub off the remaining dust completely. The feet should, however, be always washed on a return from exercise, and carefully picked out. It remains to add, that much of what I have inserted on the feeding of horses may not agree with the opinions of the out-and-out hard riders of the present day. The plan of dieting offered, and the practices recommended have, however, stood the test of very many of our great breeders and best sportsmen; and we are sure that, could the animals themselves reason on the subject, we should engage their suffrages also.

Dressing, or *grooming*.—The process of dressing can hardly be said to be my province to describe: it is, however, certainly better to be done *without* the stable, in warm weather, to avoid the dust settling on the other horses, and on the food also. The dandriff, or scurf, which is removed by the currycomb, is composed of phosphate of lime, and consequently it cannot be a very useful addition to hay or corn; neither can it prove a very acceptable guest to the eyes of the other horses. In currying of horses, let me plead for the animals: let me hint to the groom, that while he cannot bear the slightest touch under his arm, or at the bottom of his foot, or within his neck,— no, not from the sweet hand of the dairy maid,—he should remember what some ticklish horses suffer under the currycomb. Let him then think of himself, and not mistake this distressing feeling for vice. Mild wisping with a hair cloth is all that is required for a fine-coated horse; and as much of this as can be given without disturbing the temper or distressing the feelings, is good; for friction is exercise, and therefore most salutary. The legs are always benefitted by this process, but after fatiguing exercises, they are more particularly so.—There are three intentions answered by *dressing* horses: it cleans them from dust and dirt; it counteracts the artificial state of long-continued rest and inactivity to which they are subjected by confinement, by exciting the circulation; and, lastly, it gives a beauty and sleekness to the coat. Grooms usually consider only the latter intention; and, as dressing requires much labour, they are apt to resort to such means as produce a sleek smooth coat without the exertion; and this, experience tells them, is best effected by hot stables and heavy clothing. Idleness is the principal agent in this substitution; but which, to give it a hold on the good opinion of their masters, grooms assert, and horsemen believe, adds wonderfully to the health, and greatly increases the useful qualities of a horse. They often likewise add another, and if possible greater evil, by a continued use of heating spicy matters under the name of *cordials:* by these the stomach is irritated to an undue sympathy with the skin and hair, which is done by internal as well as external heat; but would be as readily effected (as respects the appearance of the animal, and infinitely more so as regards his strength and non-liability to disease) by moderate heat, regular exercise, and long-continued friction. Friction is equally beneficial with a brush as a currycomb; and to a very delicate skin, or in autumn, when the coat is always thin and about to change, it is much more so. To the legs, as already remarked, friction is of peculiar importance; they should be well rubbed by the groom on his knees, having a wisp of straw in both hands, and the leg between the two. The dressing of horses is certainly not only a salutary but a necessary part of their treatment; it should nevertheless be practised more mildly than it usually is by the generality of grooms and ostlers.

Clothing.—After what has been offered, it will not be expected I shall say much: if horses were allowed to live less artificially, nothing but a body-sheet, attached by a loose roller, would be seen in our stables; and these only as preventives to the teazing of flies, or settling of dust. But as rapid locomotion is required of all blood-like horses, so warm clothing, which acts on the coat by keeping up a free perspiration, and removing all obstructions to its close apposition, is necessarily employed. To this end, a kersey sheet and quarter-piece are used in winter for hacknies and carriage horses; a hood and breast-piece are added for racers, and also for many of our high-bred hunters, and even fancy hacks.

Clipping of Horses.—Of late years a custom has become somewhat prevalent of clipping off all the long hair of such horses as naturally get a rough winter coat, under every circumstance; as well as of such horses as, being taken in too late, will not readily shed theirs by all the efforts of grooming, or the temperature of a heated stable.

There is no doubt but that the fashion of preserving the short summer coat during the rigours of a British winter, by an extraordinary temperature, is pleasing to the eye; but those who wish to preserve appearances argue on its real advantages also. Horses, with truth they observe, with long coats sweat easily, but dry with great difficulty; and what is worse, they certainly break out again long after they have, by care, become apparently dry; which second sweat sometimes gives cold, and always weakens a tender or hard worked horse. There is here some argument; but when we find one of the warmest advocates for the custom asserting 'that a short coat is not only less liable to give cold than a long one, and is warmer also, because it lies closer to the skin,' we are completely posed, and constrained to believe Dame Nature to be a bit of a simpleton if such be really the case. I have already allowed that a glossy coat is more ornamental than a rough one; but I have shivered to see the staring hair of the sleekest of the high-bred hunter, when a fault has suddenly checked us after half an hour's burst, at nearly full speed: and I have then thought the little difference in appearance between the long and the short-coated hardly compensated for the unnatural condition. Were I, however, compelled to choose, I would prefer clipping my horse, and then keeping in a temperate stable, to that of forcing his coat from off his body by intense heat. When clipping is practised, a kersey rug and hood should be worn for a day or two, both in doors and out: after that, a linen hood and sheet may be used to exercise in, for two or three days more, when the usual habits and clothing of the horse may be resumed. Unnatural as the process is, it must, however, be confessed, that, with only moderate caution, horses do not seem to suffer from the change. Mr. Apperley, better known under the cognomen of Nimrod, shines on this subject; and, as he is a known experimentalist, his dicta are worthy of being attended to. He is the more to be attended to also, because he offers proofs of the truth of most of his statements, and is daily making converts to them.

The Feet.—The feet are always an object of particular attention with every prudent horseman, and every careful groom. Every morning they should be picked and examined, to observe whether the shoes be fast; what state they may be in; whether the clenches be not raised, so as to cut the horse; and that the heels [illegible]e shoe do not press on the foot. Where the feet grow fast, the shoes o[illegible] to be removed once in three weeks, whether they be worn out or not: a want of attention to this particular is the ruin of many horses; ignorant grooms supposing that, because the shoes are yet good, the hoof wants no alteration. The moment a foot becomes too high, it begins to contract. In hot weather, particularly when the feet are naturally dry and hard, they should be stopped every night, Clay stopping, by getting hard and dry, is not good; cow dung, or even horse dung, is a much better one, and it is rendered still more so if a small quantity of tar be put into it. If the hoofs become brittle, not only stop them, but dress them throughout the upper surface with the softening mixture directed among stoppings in the *Materia Medica.* There have been, of late, many contrivances to imitate the natural moisture of the grass to the under surface of horses' feet. Mr. Cherry's footpads are well adapted to this purpose, and deserve attention. I would further recommend, that all the litter be removed from under the fore feet the first thing in the morning; and if such feet should be naturally of the hard, dry kind, or shew any tendency to contract, wet that part of the stall with water, and wrap also some thick pieces of cloth which have been dipped in water round the hoof.

Carefully pick the feet after exercise: without this examination, a stone may press on the sole, or a nail may remain inserted in the frog, to the ruin of the animal. Inquire of the smith the convenient time for a horse to be shod: horses sometimes remain many hours in a cold shop, exposed to the tricks or brutality of persons around; but by suiting this operation to the convenience of the shoer, it can be attended to immediately. After a long journey, it is a very good plan to pull off the shoes, and turn the horse into a loose place with plenty of litter under him. It recovers the feet very fast; for horses suffer, like ourselves, from their feet becoming heated and tender in hot weather, or under severe exercise, and that when no real disease exists in them beyond the present tumefaction and congestion.

When also a horse returns hot from exercise, his saddle must have absorbed a large quantity of moisture: without care this will remain damp; and if put on in this state the next day, it will very frequently give cold: the same often happens from the body-clothes, and even from the girths, when they have been put by wet.

Exercise.

Nothing is so convincing a proof of the necessity of exercise to animals as their love of play in a state of nature; from which natural act we likewise infer, that it is much more necessary to the young and to the robust, than to the old and weakly: this remark should influence our domestic management of horses. We confine our horses not only to have them at our immediate call, but to bring them into particular states, which are artificial. Both commerce and luxury have united to produce this close keeping; and nature, to keep pace with it, has introduced numerous diseases, unknown in the original state: these it is our duty to counteract as much as lies in our power by regular and judicious *exercise*, when the ordinary work of the animal does not supply it.

Commerce and luxury have not only taught us to confine our horses, but they have forced us also to the artificial system of high and luxurious feeding, to supply an *unnatural* quantity of irritability (commonly called courage and spirit), which enables them to continue [illegible] *unnatural* exertions frequently required of them. High feeding, therefore, has its share in giving a tendency to disease, which these continued exertions counteract, and, as long as they are so continued, horses do not materially suffer: but there are times when we do not want to employ our horses; and yet we wish to keep them in a state to be able to serve us when we do want their exertions: and it is at this time they frequently suffer; for the necessity of exercise proportioned to their food is not sufficiently considered, or the time cannot be spared, or servants neglect them; and thus the horse becomes pursive, that is, he accumulates fat, his legs swell, his heels crack, and at length become greasy; all which must necessarily be the case: for the receipts of the constitution being great by the high feeding, so the outgoings, by perspiration, &c. &c. ought to be large likewise; and it follows that, if the secretions do not find their natural vents, they will find themselves artificial ones.

The muscles are composed of fibres, having a contractile power, by which all the motions of the body are performed. These fibres act best when they are placed parallel, or in a right line, to each other; but it is not always that they are so placed. Every one has seen beef, where the fleshy fibres (which form the muscles of the ox) were so interspersed with fat as to throw these fibres out of their rectilinear course. It must be just the same with fat horses; and their muscles, therefore, having their fibres separated from each other by the fat, cannot at these times act to advantage, or with their due degree of contractility. The absorbents of the body are acted on by various stimuli; *exercise* is one of the strongest of these, and by its means fat horses are made lean: when, however, the exercise is only ordinate and in due proportion, it does not emaciate the animal by wholly removing the adipose matter; it merely takes it up from the interstices of the muscles, and places it where there is less pressure; so that the horse, if well fed, still continues lusty, but the fat becomes more advantageously disposed of. *Exercise* enlarges the muscles, for Nature endeavours to become equal to her wants; therefore, when horses or dogs are trained for hunting or racing, they should have regular and long-continued exercise. *Exercise* improves the wind, by promoting an absorption of the surrounding fat from the viscera of the chest, and thus allows the lungs to expand uninterruptedly: it also enlarges the air cells of the lungs themselves; and hence, by imbibing more air, the animal can remain longer between his inspirations.

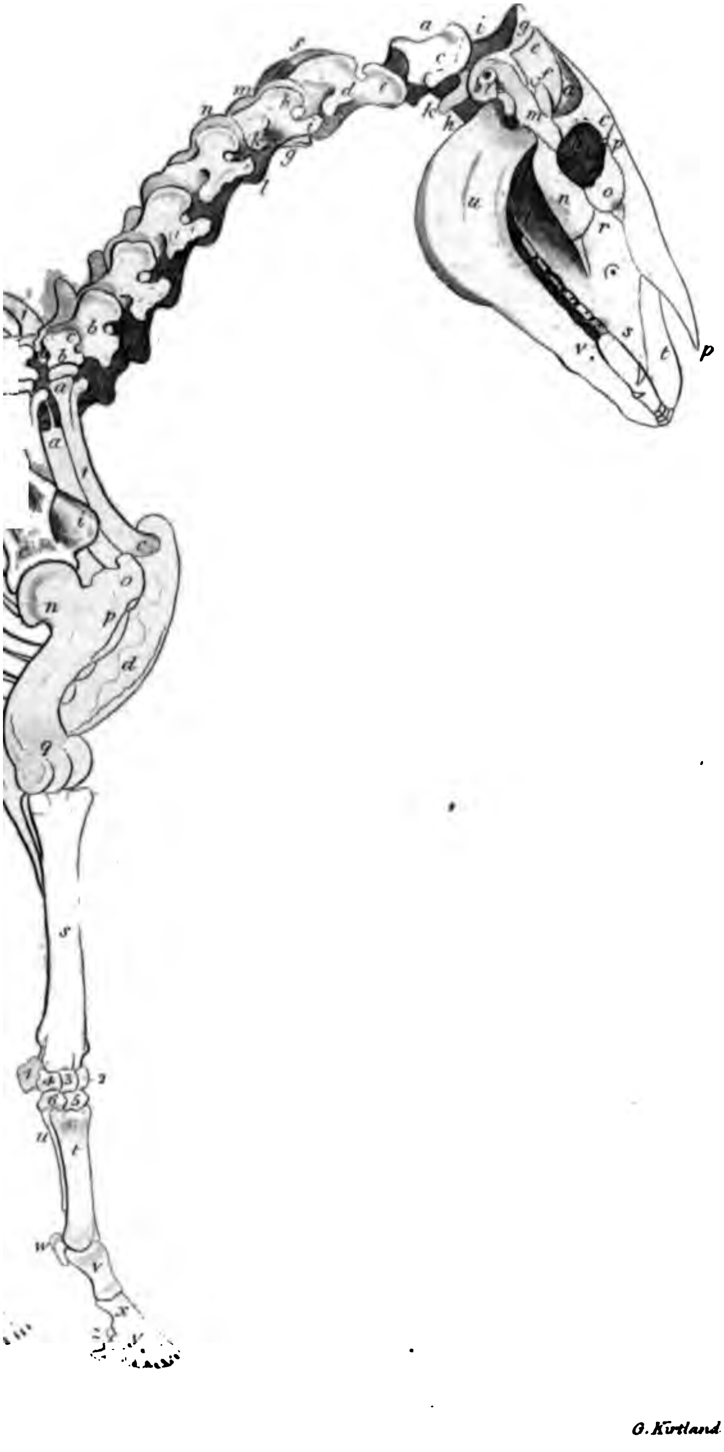
To give rules as to what quantity of exertion is necessary, we should consider the age, constitution, and mode of feeding. A young horse requires more exercise than an old one; but, if he be very young, it must then be neither very fatiguing nor very long continued. Some colts are observed to come out of the hands of the breaker with windgalls or splints, from extreme and long-continued exercise. A full-fed horse should have his exercise continued for a considerable time: if it be given once a day only, not less than an hour and a half or two hours is requisite; if twice a day, which is most natural and proper, it may be an hour each time. Horses exercising should be first walked a considerable way; they then may be gently trotted, and, if intended for hunting or racing, they may be also moderately gallopped: but, under any circumstances, the exercise should finish with a walk of sufficient length to bring the horse in cool and inirritable from the vivifying effects of arduous exertion. More is dependent on this than is usually taken into account: when a horse returns vivid and fiery, it is ten to one but he and the groom quarrel. It is evidently not my intention to offer any instruction relative to what is called *training;* I am only treating of exercise as necessary for health. Many valuable horses are spoiled by servants exercising them: it is not unusual with these gentry to gallop their horses against each other; and a horse frequently gets more severe exercise in one hour's work with the servant, than in a week's riding of the master's: to prevent this, horses should either be exercised within sight of the house, or on some road where they may be now and then seen by some one interested in the management; or, what is far better, such a groom only should be employed as will do his duty faithfully without looking after. This galloping against time, or against each other, produces heat and thirst in both horses and grooms: the latter to slake their own, resort to the public house, where half an hour is spent in drinking, and that while the shivering animals stand at the door. The time now lost must be made up by another gallop, and the horses are returned to the stable in a profuse perspiration, by which they frequently contract serious indisposition; which is still more likely to happen if, as is frequently the case, they are washed with cold water, and then permitted to dry at leisure; and this, it may be observed, is always a bad custom, for the heat and moisture united, encourage a determination of blood to the legs, and occasion swelling, and often grease. A horse, therefore, should be brought home after his exercise as cool as possible, and, if washed, he should be carefully rubbed dry. Friction itself may be considered as a species of artificial exercise, and as the best substitute for it; and whenever, therefore, circumstances prevent exercise, as frosts, lameness, &c. &c. a greater share of hand-rubbing should be made use of.—As the prevention of disease is better than the cure, so it is greatly to our interest to attend to stable management in all the particulars detailed. By frequenting their stables, masters become interested in the personal comfort of their horses, and a new pleasure opens itself to them. Nor are the horses themselves unmindful of this, but amply repay such attention by becoming personally attached to such masters, and much more willing and obedient to them. This is exemplified in borrowed horses, which, though enjoying and deserving the reputation of excellent, are frequently found by the borrower, sluggish, wilful, and often vicious.

We think it not unlikely that some of our readers may object to the extent and circumstantiality of this first portion of our work. Some may think that they need not the information offered, and others that the room taken up would have been better occupied by a more ample therapeutic detail. We, however, opine that instruction offered on the treatment of domestic animals in health will lead to a more ready detection of their diseased states, and to a more successful method of combatting them.

PART THE SECOND.

THE
ANATOMY OF THE HORSE;
OR,
A DESCRIPTION
OF THE
STRUCTURE, FUNCTIONS, AND ECONOMY OF ALL THE PARTS OF HIS BODY.

Plate 1.



G. Kirtland sculp.

SECT. VIII.

THE ANATOMY OF THE HORSE.

ANATOMY teaches the structure, functions, and economy of the various parts of the animal frame. It appears both convenient and systematic to consider it under the several heads of

OSTEOLOGY, or the doctrine of the	BONES
SYNDESMOLOGY	LIGAMENTS
MYOLOGY	MUSCLES
BURSALOGY	MUCOUS CAPSULES
ANGIOLOGY	VESSELS
NEUROLOGY	NERVES
ANDENOLOGY	GLANDS
SPLANCHNOLOGY	VISCERA
HYGROLOGY	FLUIDS.

In the following detail I have, throughout, blended the functions of the parts with their formation; the one illustrating the other, and both being essential to the art it is the object of the work to teach.

OSTEOLOGY.

BONES are hard, white, insensible bodies, which sustain the soft parts, and form the base of the animal machine. They are composed of earth, cartilage, and membrane. The membrane appears first formed, into which cartilage is deposited: gradually the arteries pour out within the centre of each bone the *earthy matter*, until the whole is completely consolidated. This consolidation does not take place in all the bones until the full growth of the animal; neither are the stages of osseous evolution alike in each bone, those becoming soonest ossified whose use could be least dispensed with; and thus, also, the evolution of the bones in the indigent tribes, as kittens, puppies, &c. is less perfect at birth than in the foal, lamb, calf, or others, who have to make exertions as soon as born. The bones of the horse are much harder than those of man, and consequently stronger. The deposit of earthy matter, and the consequent consolidation of their substance, appears to be hastened by any thing that permanently quickens the circulation, by occasioning a more speedy separation of the earthy parts from the blood: it is thus that the inhabitants of warm climates come to perfection sooner than those of the northern regions. But by preternaturally hastening the earthy deposit in the bones we check their growth; thus, horses early and severely worked, never arrive at their full size. Pressure likewise appears to assist ossification; parts, therefore, long exposed to it, as the cartilaginous ends of the spinous processes of the vertebræ, ossify from the pressure of the saddle or heavy burdens. To unnatural pressure we also attribute the '*putting out*' of splints and spavins in young horses which have been too early and too hard worked.

The earthy matter of bones is continually changing by means of the absorbents, which remove it, and the arteries which replace it. Its quantity also depends on the wants of the animal and the stimulus applied: in the full-bred horse, therefore, the bones will be found more solid than in the bulky lower bred varieties. The cavernous part of a bone is lined by a membrane, called the *internal periosteum*, which retains the *medulla* or *marrow* in its cells: the bones have also an *external periosteum*, or outer covering (see *Syndesmology*). The medullary cavities have the effect of diminishing the weight of bones without weakening them. Bones, though furnished with blood-vessels and nerves, have little sensibility, except under inflammation, to which they are very liable in the horse; at least to that kind which produces exostosis. The varieties in the form of bones have occasioned their division into cylindrical, flat, spherical, and irregular. They are furnished with cavities and eminences: the cavities are glenæ, or narrow and shallow; cotylæ, or deep and wide: they have, also, pits, furrows, notches, fossæ, sinnses, foraminæ, &c. The eminences are epiphyses, whose use is often to increase the surface of attachment of tendons, or to remove their axis farther from the centre of motion: apophyses are parts added to a large bone. Processes form themselves into a caput or head, or a cervix or neck: a rough one is a tuberosity, and others are called mastoid, styloid, &c.: protuberant brims are called supercilia, &c. &c. Bones articulate with each other either by diarthrosis, or separated articulation; or by synarthrosis, or conjoined articulation. Symphysis is also a species of articulation which takes place through the medium of another body, as cartilage, ligament, &c.

DESCRIPTION OF PLATE I.

HEAD.

a, b, c, d, os frontis. Only one can be seen; the sagittal suture which divides them, and which also unites the pair, is exactly in front of the head; *a,* the coronal suture; between *a* and *b,* the orbitar apophysis, with the supra-orbital foramen on it; *b,* the portion of the frontal forming the orbit: *d,* the portion uniting it with the malar and palatine bones; *e, f,* parietal bone; *e,* its junction with the occipital by the lambdoidal suture; *g, h, i, k,* occipital bone; *g,* occipital protuberance; *h,* its cuneiform proccess; *i,* the condyloid process received into the atlas; *k,* the pteregoid process, one peculiar to the horse. *l, m,* Temporal bone, the squamous portion is seen just above the zygomatic arch; joined to the parietal by the squamous suture; *l,* the petrous portion forming the internal ear; *m,* the zygomatic process forming the zygomatic arch, seen uniting with the orbitary process of the frontal, and the zygomatic process of the malar, by two sutures; *n,* malar, jugal, or cheek bones; the dark line immediately under, is the spine, which is continued into the maxillary; *o,* os lachrymalis, *p, p,* nasal bones; *q, r, ſ,* superior maxillary; *q,* the portion uniting with the malar and palatine bones; *r,* that uniting with the malar and angular; the triangular space shews a portion of bone that is sometimes formed between, called os triquetra; *ſ,* the inferior portion uniting the inferior maxillary; between *r* and *ſ,* is seen the superior maxillary canal. *t,* the inferior maxillary bone; *u, v, l, m,* maxilla posterior, or lower jaw; *u,* the branches; *v,* posterior maxillary canal; *m,* both above passing under the zygomatic arch.

VERTEBRÆ.

a, b, the seven cervical vertebræ; *a,* the atlas; *d, e, f,* dentata or second; *d,* its single transverse process; *e,* its upper oblique process; *f,* its ridge answering for a spinous process; *g, h, i, k, l, m, n,* third cervical vertebra; *g,* its body; above the letter is the hole for the transmission of the vertebral arteries and veins; *i, k,* anterior and posterior transverse processes; between *h* and *i,* is a hole through which the cervical nerves pass; *l,* anterior protuberance in the body; *m,* the spinous process; *h,* the upper oblique processes; *n,* the lower oblique processes; 1, 18, marks the 18 dorsal vertebræ; *a,* the body; the space between each is filled by a cartilago-ligamentous substance; *b,* the transverse processes, articulating with the head of each rib; *c,* their upper oblique processes; *d,* their lower ditto. 1, 5, the five lumbar vertebræ, their transverse processes are very long, but from the fore shortening in the perspective, are not very evident in the plate; *x, x,* the sacrum composed of five pieces; the spinous processes are the only parts distinct: the transverse are united into one unequal rough part; 1, 13, the coccygis or bones of the tail; the spinous and transverse processes are distinct only on the first four or five.

STERNUM, RIBS, SHOULDER, AND ANTERIOR EXTREMITIES.

a, b, 1, 9, the true ribs; 10, 18, the false ribs; *a,* the head articulating with the transverse process of first dorsal vertebra; under is seen the lower branch of the head that unites with the seventh cervical and first dorsal vertebra; *c*, the end that unites with the sternum; *d*, the sternum; *e*, *f*, *g*, *h*, *i*, *l*, *m*, the scapula; *e*, its neck, below which is seen its glenoid cavity; *f*, antea spinatus fossa; *h*, its spine, which in the human ends in the processus acromion, but here by a tuberosity; *i*, coracoid process; between *m* and *i*, the anterior costa; *l*, between this and *e*, posterior costa; between *m* and *l* is its base, and the line above it marks the extent and situation of the cartilage of the scapula; *n*, *o*, *p*, *q*, humerus or arm, *n*, its cervix, above which is seen its head; *o*, its anterior head, forming the point of the shoulder, as it is usually called, in the horse; *p*, its tuberosity; *q*, its lower head; behind is seen the cavity for the reception of the olecranon; *r*, *r*, ulna; the upper part forms the olecranon or elbow; the lower part is united by ligamentous fibres to the radius; *f*, *f*, the radius; 1, 2, 3, 3, 4, 5, 6, 7, the carpus or knee; 1, 1, trapezium; 2, 2, scaphoid; 3, 3, lunar; 4, cuneiform; 5, magnum; 6, unciform; 7, trapezoid; *t*, *u*, metacarpus, *t*, canon; *u*, two small metacarpals; *v*, great pastern; *w*, sessamoids; *x*, coronet bone, or little pastern; *y*, coffin; *z*, navicular or nut bone.

PELVIS AND POSTERIOR LIMBS.

a, *b*, *c*, *d*, *e*, *f*, *g*, the two ossa innominata; *a*, *b*, *c*, ilium; *a*, tuberosity of ilium, forming the haunch or hip; *c*, the union with ischium; *e*, *f*, ischium; *g*, *g*, pubis; and between the letters, the symphysis; *d*, foramen thyroideum; *h*, *i*, *k*, *l*, *m*, femur or thigh bone; *h*, the cervix, above which is the head received into the acetabulum of the pelvis; *i*, great trochanter; *k*, the outer trochanter; *l*, *l*, the inner trochanter; *m*, *m*, the anterior, condyles; *n*, *n*, the posterior ditto; *p*, *p*, semilunar cartilages; *o*, *o*, patella; *q*, tibia or leg, commonly called the thigh; *r*, *fibula;* the tibia is seen terminating in its maleoli, to articulate with the tarsus; 1, 2, 3, 4, 5, 6, 7, 8, tarsus or hock, 1, 2, 1, 2, calcis, forming the point of hock, in man the heel; 3, 4, astragalus; 5, 5, cuneiform magnum; 6, cuboides; 7, cuneiform medium; 8, cuneiform parvum. *f*, *f*, *t*, *t*, metatarsus; *f*, *f*, canon or shank; *t*, *t*, two small metatarsals; *u*, pastern; *v*, sessamoids; *w*, coronet bone or lesser pastern; *x*, *x*, coffin; *y*, nut or navicular.

BONES OF THE HEAD.

THE osseous structure of the head presents the bones of the skull, face, and posterior jaw, which altogether, form a figure very different from that of the human subject, principally owing to the elongation of the nose and jaws, and the confined area of the skull.

The Cranium or Skull

Is composed of the following bones, which are mostly united together by *sutures* or interlacing of their edges. This junction gives great strength, and forms a vaulted cavity for the reception and preservation of the brain. The cranial bones are not thus united until birth, or soon after it*.

The *frontal* bones (*ossa frontis*) are situated at the upper and anterior part of the head, (*a*, *b*, *c*, *d*, *plate* I), their union forming a part of the *sagittal suture*, and their inner surface lodging the anterior and inferior part of the brain, while a division of the inner from the outer surface leaves two cavities, called the *frontal sinuses*. Laterally, these bones are connected with the malar by the orbitary process, their union forming the *zygomatic sutures;* inferiorly, they join the nasal bones, and interiorly the ethmoid and sphenoid. The orbitar process forms the *greater orbitar fossa*, or cavity over the eye; in which process *(see plate of skeleton between* a *and* b, *bones of head)* is seen a niche or hole, called the supra-orbital foramen, giving passage to a branch of the fifth pair of nerves and to the bloodvessels furnishing the supercilia and parts adjacent.

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* By this imperfect union of the fœtal foal's cranial bones, little obstruction is offered to its expulsion from the womb; for the edges of the bones being not yet consolidated, allow them to overlap, and thus lessen the bulk of the head. By the number of the cranial pieces a great advantage is also gained; for each bone growing distinctly from its own centre, the general increase is rapid, to meet the rapid evolution of the organs after birth.

The *parietal*, or wall-like bones *(ossa parietalia)*, which in the ox and sheep form a single mass, are placed between the temporal, frontal, and occipital bones: they unite together by the *sagittal* suture: they are connected to the frontal by the *coronal;* and laterally, to the temporal by the *squamous* sutures. The *temporal* bones *(ossa temporum)* are divided into the squamous and petrous portions, which remain always distinct. Considered, as they usually are, as one pair of bones, each has a single cavity, very irregular in figure, and unites with all the bones of the skull but the ethmoid. The *squamous portion* is joined to the parietal by the squamous suture, and has a large peculiar process, called the *zygomatic*, which contributes, with a lesser one of the malar bone, to form the *zygoma*, or *arch of the cheek:* nearly at the root of this process is a protuberant cartilaginous cavity, articulating with and receiving the condyloid process of the lower jaw. Within the *petrous portion*, which is situated at the root of the outer ear, is a distinct cavity, forming the osseous hollow of the internal ear.

The *sphenoid (os sphenoides)*, a very irregular bone, is connected with the occipital, ethmoid, temporal, palate bones, and the vomer, to which it is, as it were, a key. Within, it presents a cavity called *sphenoidal sinus*, communicating with the ethmoidal cells.

The *ethmoid (os ethmoides)* of the horse, a very considerable bone, is situated under the superior part of the nasal fossæ, between the frontal and sphenoidal bones, and is made up of numerous cells of very irregular figures and direction, which are all lined with the pituitary membrane, and communicate with the frontal sinuses, terminating in the anterior turbinated bones *.

The *occipital (os occipitis)* is situated at the summit of the head *(vide g, h, i, k, Plate* I), and is the largest of the bones of the skull, articulating with the parietals by the *lambdoidal suture;* to the temporals, by their petrous portion; and by its cuneiform process to the sphenoid bone. It rises superiorly into a ridge, or perpendicular process, to which the cervical ligament of the neck is attached; and here, the head being much exposed, the bone is wisely made of extreme thickness. By its *condyloid apophyses* it articulates with the atlas; and its *cuneiform process*, which is very large *(vide h, Plate* I), is received as a wedge among the bones of the skull. It is pierced at the posterior aspect of the skull by the *foramen magnum*, which gives passage to the spinal cord.

The Face.

The *nasal* bones *(ossa nasi; vide p, Plate* I) are united together throughout their whole length, and internally receive the cartilaginous *septum narium*. They are connected interiorly with the anterior turbinated bones; superiorly with the frontals: superiorly and laterally with the angulars; and inferiorly with the lower maxillary. The *nasal fossæ* are formed by means of these, in conjunction with the maxillary bones laterally; superiorly of the posterior table of the frontals, forming the frontal sinuses, with which they communicate; and posteriorly of the palatine bones. The *lachrymals*, or *ossa la-*

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* These cells are filled with purulent matter in *glanders;* and in the *distemper* of dogs they are so likewise, when the disease is very virulent.

chrymalia, are situated at the inner angle of the eyes *(vide o, Plate* I), and form a considerable portion of the orbits. Each is nearly square, and joined to the nasal, malar, frontal, and superior maxillary bones: its orbitary ridge is perforated by a canal, just within the inner angle of the eye, forming the *lachrymal duct*, or *ductus ad nasum*, which carries off the superfluous tears into the nose. This duct passes bony between the turbinated bones, and then becomes membranous under the inferior or posterior of them. The *malar*, *jugal*, or *cheek* bones *(ossa malarum)*, occupy the posterior part of the orbits *(vide n, Plate* I), between the angular, superior maxillary, and temporal bones; to the last of which each is united by its temporal process, and forms part of the zygomatic arch.

The *superior maxillary* bones *(ossa maxillaria superiora)* are the largest of those particularly belonging to the face, and are connected anteriorly to the nasal; inferiorly to the inferior maxillary; and internally to each other, and to the palatine by their palatine processes: to the vomer also, and within the orbit to the zygomatic process of the temporal bones. Their exterior surface is convex, and has upon it the maxillary spine continued from the malar: midway between this and the junction with the nasal bone, there is a foramen called the *anterior maxillary canal*, which is continued through each of them, and transmits the second branch of the fifth pair of nerves, with some vessels; all which go to supply the molar teeth: its inferior edge is pierced by the molar alveoli. By their junction with each other posteriorly, these bones form the inferior portion of the palatine arch, or roof of the mouth; the superior part of which arch is formed by the palatine bones themselves, to which the maxillary are united. Their internal surface lodges the turbinated bones, with which the anterior of them is nearly filled *(q, r, s, Plate* I).

The *inferior maxillary* bones *(ossa maxillaria inferiora)* have been frequently considered as parts of those last described, although the division between them is as evident as that betweeen the frontals and parietals*. Mr. Stubbs falls into the same error. These bones are wanting in the human, and are peculiar to animals with long jaws; they unite together by symphysis, and to the inferior maxillary and nasal bones by suture. They concur in forming part of the nasal fossæ, and at their inferior edge have six *alveoli*, lodging the anterior incisive teeth. At the symphysis is a foramen, giving passage to bloodvessels and a nerve. *(Vide t, Skel.)*—The *palatines (ossa palati superiora)* are situated at the upper part of the bony palate, beyond the superior maxillary, to which they unite, and jointly form the arch of the palate: superiorly, they unite to the wings of the sphenoid, and leave an oval opening between them and its body, which forms the entrance of the nasal fossa into the pharynx. *Os triquatra (vide o, r.)* It is not uncommon to find a triangular portion of bony plate interposed between the unguis, superior maxillary, and the nasal bones. In oxen and sheep it is seldom met with. The *superior turbinated* bones *(ossa turbinata superiora)* are thin, bony lamellæ, within each superior maxillary bone. They are connected with the nasal bones, and receive the continuation of the ethmoidal cells, and are seen, on opening the nostrils, forming a species of tortuous cavity.—The *inferior turbinated* bones *(ossa turbinata*

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* Blumenbach terms it the *intermaxillary;* and as it is not found in man, he considered it as a distinctive mark between the human and brute subjects. It is, however, found that no such bone exists in some of the long-tailed monkeys, although it is present in some of the short-tailed tribes: such distinction, therefore, is fallacious.

inferiora) occupy the remainder of the cavity of the maxillary bones; being tortuous in situation, and spongy in texture, they increase the surface of the pituitary membrane, which readily explains the reason why they are so considerable in brutes, and so trivial in man.

The *vomer*, or ploughshare, is a single bone, and extends from the inferior part of the nasal fossæ, so as to divide (in conjunction with the cartilaginous septum) the nostrils into two equal cavities; superiorly it joins the sphenoid, and inferiorly is received into a groove of the palatine process of the maxillary bone; it is likewise connected with the ethmoid.

The Posterior Jaw.

The *posterior maxillary* bone *(maxilla inferior)*, or *lower jaw*, is, in the fœtus, composed of two pieces, afterwards intimately united by symphysis at the chin. The anterior edge, by a separation of its tables, forms the *alveoli* for the reception of the molares or grinders, the tushes and incisive teeth. Superiorly and anteriorly it forms two considerable branches; the external angle of each of which is the thickest portion of the whole, and is thence called the tuberosity: the branches themselves end in two processes with an intermediate groove. The first, and most superior of these, is called the *condyloid process*, having a flat head tipped with cartilage, which articulates with a cartilaginous depression of the zygomatic process of the temporal bone (see *Skel.*); between which articulations is placed, as in the human, a moveable cartilaginous piece, accommodating itself by its figure to the motions of the jaw. The second process is the *coronoid*, which is flat, and passes under the zygomatic arch (*vide f* and *m*, *Skel.*) having the crotaphite muscle inserted into it: were it not for this arch, every accidental pressure, and every slight injury, would impede the motion of the jaw, and might starve the animal. The whole likewise shews the most admirable mechanism: the molar teeth, on whose action most is dependent, are operated on by very powerful muscles; and as the upper jaw in most animals is nearly fixed, so it was necessary in the horse, and other graminivora, that the lower should have considerable extent of action, as well as of force, for the purpose of grinding, and it is accordingly so formed as to admit of motion in every direction*.

The Teeth

Are very important organs, and deserve an attentive examination of their anatomy and physiology. The parabolic line formed by their arrangement in their alveolary sockets is called the dental arcade, of which there is an upper or anterior, and a lower or posterior. Each arcade presents two rows of teeth, which are not continuous, but interrupted by a vacancy, which is also interrupted, by the admission of a single canine tooth. Inferiorly, the fellow arcades form a circle of union, embracing the nippers. The teeth of the horse are divided into *incisores*, *cuspidati*, and *molares*, or, popularly,

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* A mere inspection of the articulation of a brute jaw separated from the body would enable a naturalist to determine whether it belonged to a carnivorous or herbivorous animal. When the articulation is so formed as to admit of vertical motion only, it may safely be determined to belong to one of the carnivora; but when it appears endowed with both vertical and horizontal motion, it will be found to have formed a part of an animal of the herbivorous order.

nippers, *tushes*, and *grinders*[*]. Each tooth is formed of a crown, neck, and root. The crown is the upper part, and is variously formed in the different teeth; the neck is not very evident in the adult horse, but is more distinct in the colt.

The *incisores* or nippers of the adult horse are six above and six below. The *free* part of each presents a cone-like figure, whose apex is wedged within the alveolary socket, and whose base is the table of the tooth. By this arrangement room is allowed between each nipper for the surrounding gums and bony partitions; while the roots remain in contact with each other. An incisor in a horse of six years of age is oval at its base, round in its body, and triangular at its apex or alveolary portion. This specified form, however, becomes much altered and modified by time, and the changes which take place form the ground-work of those tabular indications of age depicted on *plate* II. The anterior or outer surface of an incisor is slightly convex, and presents two longitudinal channels, which are deeper in the upper than in the under jaw. The table or nipping surface is furnished with an oval-shaped fossa in its centre, which is interrupted in the corner teeth by a species of artificial side or internal wall received within an inflection of the outer. Among horsemen this cavity is known by the name of the *mark*, i. e. mark of the age. (See *Exterior Conformation.*) The corner teeth are likewise altogether more thin and *shelly* than the other nippers, and are slightly triangular in figure (see *plate* II). The dental fossa of the table surface is not originally of more than a few lines in depth; it is, however, deepest in the corner nippers, less so in the middle teeth, and least of all in the central. 'In the early periods of its formation, an incisor resembles a cellular body, the thin sides of which are soft and membranous, but promptly becoming hard and thickened, are reflected at the side of the table. This first dental production gives rise to two cavities that have no communication with each other, and differ most essentially: the largest being situated next the root *(c, fig.* 1, *plate* II) contains the pulpy substance, whilst the outer cavity is open at the side next the table, forming a reflected funnel *(b fig.)*. This same dental production becomes transformed into enamel, which is quickly surrounded by the bony substance on both of its surfaces; the latter incrusts itself in greater quantity on the side next the root, and never completely fills the funnel, the cavity of which does not become obliterated, but by the effect of wear. The funnel *(b, fig.)* is formed, as has been just stated, by the reflection of the elementary membrane of the tooth, and forms a genuine septum or partition, acquires a certain length, and terminates in a rounded blind pouch.'—*M. Girard on the Teeth;* Ganly's Trans. Editor's Preface, p. 5.

The molares or grinders are twenty-four, six being implanted in each ramus of the jaws[†]. The upper are larger and stronger than the under, which was a wise provision, as they form the fixed point on which mastication is performed. The first and last molar teeth, above and below, are triangular; and while the extended angles (as well expressed by Mr. Percivall) 'of the four inferior are directed downwards, those of the last, or superior, are so upwards. Indeed, these four teeth, instead of being inclined inwards in their sockets, are literally curved; so that the upper ones of the anterior jaw press with their roots against the floor of the maxillary sinuses, and those of the posterior jaw run upwards into its branches.' The internal anatomy of the grinding teeth is thus clearly pourtrayed by the ingenious writer of 'The Horse,' in the *Farmer's Series of Useful Knowledge:* 'Each molar tooth is formed and prepared in cavities within the jaw-bones. A delicate membranous bag, containing a jelly-like substance, is found in the unborn animal, in a little cell within the jaw-bone. It assumes, by degrees, the form of the tooth that is to appear, and then the jelly within the membrane begins to change to bony matter; and a hard and beautiful chrystallization is formed on the membrane without; and thus the cutting tooth becomes covered by its enamel. In the formation, however, of each of the grinders of the horse, there are originally five of these membranous bags in the upper jaw, and four in the lower filled with jelly. This jelly, by degrees, gives place to bony matter, which is thrown out by little vessels penetrating into it, and is represented by the darker portions (*fig.* 4, *plate* II, which is a horizontal section of a molar tooth) with central black spots. The crystallization of enamel can be traced around each; and so there would be five distinct bones or teeth. A third substance, however, is now secreted (which is represented by the white spaces), and is a powerful cement, uniting all these distinct bones into one body, and making one tooth of the five: this being done, another coat of enamel spreads over the sides, *but not the top*, and the tooth is completed. The grinders in the lower jaw, having originally but four of these bags or shells, are smaller and narrower, and more regular than the upper ones. They are not placed horizontally in either jaw; but in the lower, the higher side is within, and shelving inward; and thus the grinding motion is most advantageously performed.'

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[*] These varieties of teeth are common to man, and to many other quadrupeds besides the horse, as the quadrumana, the carnivora, the pachydermata, and the hornless ruminants; but it is in man only that they are found closely approximated in one uninterrupted line of continuity.

[†] 'The anterior molars, three in number on each side, have long been (and upon the authority of Aristotle) considered as permanent. Buffon, Bourgelat, and Daubenton, continued to look on them as such, although Ruini had published, in 1598, that two of these teeth were temporary; and that error was persisted in, until Tenon had established, positively, that the three anterior molars were liable to fall and to be replaced.'—*Ganly's Girard.*

In the Veterinary Museum are two anterior jaws which have each eight molar teeth. Mr. Cherry is also said to possess a posterior jaw with four only.

Teeth are supposed to have some specialties of structure which distinguish them from simple bone; and, *à priori*, something of this kind might have been expected. Common bone is never exposed to the action of the external air, nor is it ever subjected to abrasion: on the contrary, when two become opposed to each other, a cartilage tips the end of each, to prevent either friction or concussion. The teeth have one-third of their substance not only exposed to the action of the air, but are very often brought into contact with the hardest bodies. It is not to be wondered at, therefore, if some speciality is found in them; neither ought it be a matter of surprise if the free or exposed portions, as the crown and bodies, and the covered parts, as the root or fangs, should be seldom formed altogether of the same materials: and even where they are in the main similar, yet the proportions of their substances vary, or the modes in which they are distributed are unlike. *Enamel*, *ivory*, and *cement*, enter the composition of the teeth of the horse generally; but, individually, their distribution varies. In the nippers and tushes, the enamel covers the whole of the free portion; in the grinders, instead of covering the surface of the table generally, we see that it forms distinct penetrating layers*. Of these dental components, the *enamel* is by far the hardest and densest: it also contains less animal matter, and, when examined closely, appears fibrous. It will yield fire, with steel, like flint, and is hardly to be acted upon by the best tempered files: it never occurs alone, but always as a coating to the ivory of the tooth (*a a, e e, figs.* 1, 4, *plate* II). The enamel, chemically examined, appears to be a crystalline compound, from gelatine and phosphate of lime, and is secreted from the membrane of the pulp.

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* By comparative anatomy we are frequently enabled to throw great light on the functions of particular parts of the human body, by which some of the obligation due to the

The *ivory* is harder than common bone; it is also fibrous, and is the produce of the pulp of the tooth in the early state, which consolidating, forms the substance of each tooth. It is principally different from bone in containing more phosphate of lime; or, according to some, fluoric acid, in combination with lime. The *cement* is softer than either of the other components, contains more animal matter, and resembles more nearly the common bone of the body. Sir Everard Home attributes its produce to an ossification of the secreting membrane of the enamel; Cuvier considers it as a specific secretion. It may perhaps be better explained after this manner: The pulp from whence the ivory is secreted is surrounded by a membranaceous capsule, and presents two layers; the central layer secretes the enamel, while the outer furnishes the cement, and surrounds the terticeous striæ of enamel, and unites the other substances into one firm mass.

The *cuspidati, canini,* or *tushes,* are four, and are usually, but not invariably, confined to horses*. They are situated so as to break a long vacant

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knowledge of the latter are repaid. I have had frequent occasions of pointing to this mutual advantage; perhaps a more felicitous one does not occur than the present, in which erroneous notions on the subject of the preservative use of the enamel have prevailed, and are yet every day insisted on by dentists. Were a preservative quality the principal use of the enamel, the teeth of both man and beast would be seldom free from decay. In both the one and the other, parts of the teeth are entirely deprived of it, and in neither does decay take place at such parts. The depressions on the broad surfaces of the horse molar teeth are, as described above, purposely formed from the first without enamel, and on the surface of the incisors or nippers it early wears away, and yet caries is almost unknown to both. The human incisors also wear from a sharp edge to a flattened surface, entirely uncovered by enamel, but on which surface caries never commences; on the contrary, when these decay, the disease commences at the neck of the tooth where the enamel is thickly encrusted over. The first carious spot usually seen in the human molar teeth is in the deep depressions on their semi-incisive grinding surface, where the enamel can suffer no abrasion: add to which, that decay in a tooth may generally be stopped, if the whole of the diseased portion be filed away. Some tribes among the Indians, remarked for the soundness and goodness of their teeth, always keep them filed to a point; we therefore learn, by collating these facts, that the enamel of the teeth operates little in preserving them from morbid decay; but that its principal use is, by its extreme hardness, so to temper the teeth, as steel tempers iron, that they may resist the impressions of constant mastications, and make the wear of these organs commensurate with that of the body in general.

* Appearances of these teeth are not infrequently met with in mares, in the form of small, irregular, bony knobs; and, indeed, in all mares there are rudiments or markings of them in maxillary bones, which in many cases become somewhat developed by age. The ancients entertained a notion, but which is not confirmed by fact, that such mares as had them were always barren. The tushes are occasionally double; and Mr. Percivall has a posterior or lower jaw which contains two springing from separate sockets on the near side. I remember also to have seen, in Cow Cross, Smithfield, two jaws with supernumerary tushes. In France I saw also four distinct tushes in an upper jaw: other irregularities in their formation are likewise not uncommon. Mr. Percivall appears to think the canine teeth given as weapons of defence, which appears to me questionable: they are not sufficiently extended for such purposes, nor is it ever observed that in the most offensive attacks of the horse he employs more than the incisors, which are capable of inflicting a very terrible laceration; and which are used also as prehensile weapons to hold an enemy while he is shaken to pieces by repeated concussions, or battered to death by the fore feet. It may be added, that castration does not produce any alteration on the tushes of the horse, as on the

border between the incisors and molar teeth; those of the upper or anterior jaw being placed nearer to the grinders than those of the under, which prevents any interference between them. There are no temporaneous tushes, but one set only, which appears rather irregularly about the adult period, growing slowly, and when completely evolved, presenting a slightly curved figure, turned inwards, with an outer plain surface, and an inner one having two perpendicular grooves with an intermediate rising. The upper part is originally pointed; but the point wears away by age, leaving the tush blunted: the internal surface also, by accretion, becomes smooth and equal with the outer; and as these appearances cannot be restored, the tushes may be depended on as a guide in judging of the age, when a horse is suspected of having been *bishopped.* 'So long as the tusk lies hidden in its socket, it has no fang, and consists simply of a thin thimble-like shell of hard substance; but as the body emerges, the root also elongates, and a fang forms, which is only perfected when the tooth itself has attained its greatest evolution in the mouth. At this period the tusk is hollow throughout, and is perforated at its root by a small foramen; but as years advance the growth, the cavity gradually fills up, and in old horses we perceive no remains of it. The horse, in common with man and the greater number of quadrupeds, is provided with a *primary* and a *secondary*, or, as is more usually expressed, with a *temporaneous, shedding*, or *milk set* of teeth, and a *permanent*, or *adult*, or *horse set.* The primary dentition has already commenced at birth: the *secondary* or *permanent*, although not completed before the adult period, is successively appearing from the second year. This change, by which the temporaneous teeth are displaced for the permanent, being very gradually performed, the animal suffers no inconvenience: were all the teeth, or even several of them, to be removed at the same time, the animal would suffer great injury.

Although the temporaneous and permanent sets of teeth appear with an interval of some years between them, yet the rudiments of both are formed nearly at the same period; and the latter seem to be only prevented from making their appearance from the pressure occasioned by the former, or those above them: thus, when one of the first set is drawn, its place is soon filled up by one of the second set; and which promptness of growth is most convenient, as by its means a new tooth may be soon ready to fill up any accidental displacement that may occur before the usual period. If it be asked here, why does not the same pressure which keeps down the permanent set remove the temporaneous above them? it may be readily answered, that these lower teeth are not sufficiently consolidated; but that, as soon as they become so, they in turn become the pressing bodies, and the roots of the temporaneous set, submitting to the stimulus, become absorbed. Dealers avail themselves of this, and, as already shewn when treating on the teeth as connected with the age, they draw the first, to produce a more early evolution of the second set.

It was essentially necessary that there should be two sets of teeth; for as these bodies grow but slowly in proportion to the jaws, so, had there been

horns of deer; it neither retards nor advances the period of their evolution, which is naturally less regular than that of the other teeth. These united circumstances are unfavourable to any opinion of their being organs purposely designed for offence. In the horse, as in man, these teeth may, I think, be rather considered as placed in the jaws to preserve that order and harmony so conspicuous throughout the links of nature's vast chain; while to the elephant, the boar, the dog, and some other quadrupeds, where they are long and pointed, they appear truly pugnatory organs.

but one, the disproportion in growth between the teeth and the jaw bones must have separated the teeth from each other as the jaws increased in length; hence there is given at first a small and less numerous set, adapted to the size of the bones. The living powers in the teeth are kept up, as in bones in general, by nerves and bloodvessels, which may be traced entering the hollows in their roots from trunks described in *Angiology* and *Neurology*. We have also sufficient proof of their having absorbents, by the removal of the roots of the temporaneous set by the process of absorption.

The *economy of the teeth*, as organs of mastication, is peculiarly interesting; and, in a practical point of view, its consideration is important to the veterinarian. The nippers may be considered both as cutters and vellicators; for they embrace the vegetable matters around them, and by a *twitch*, or sudden motion of the head, they partly cut it with the edges of the nippers and partly tear it up. They are less properly named gatherers; for the gathering together the edible substances previous to the teeth closing on them is made by the lips, which act the part of fingers, as may be readily seen by watching their activity in collecting the grains of corn from the bottom of a manger. The food taken between the nippers is quickly passed upwards or backwards by means of the tongue and molar muscles, and is placed between the crushing organs, the molares or grinding teeth, where it meets surfaces above and below of impenetrable hardness, whose prominences exactly adapting themselves to the depressions of those opposed to them, allow nothing to escape without being completely comminuted. Nothing could, therefore, be better devised than the intermixture of a mass of such density as the enamel, with one less so; by which an uneven surface, like the peckings of a mill-stone, is kept up to the latest periods of life: and as the ridges of one set are received into the depressions of the other, it permits a just application of the teeth, and a consequent complete shutting of the mouth during a state of rest.

Constant attrition must, however, necessarily affect even these powerful machines; and although nature has amply provided for an ordinate wear, she has not stepped out of her course to invariably supply that inordinate one produced by a long-continued consumption of hay and dried grain in lieu of grass and other succulent herbage. So long as the grinding surfaces of the teeth remain truly opposed to each other, little inconvenience is felt; but sometimes age and other circumstances will alter this: sometimes also one particular tooth preternaturally shoots up, and irritates, and even extensively ulcerates, the surfaces of the mouth. Such a horse wastes, and wonder is excited at the cause; but were he observed, he would be seen, when eating, to incline his head in such a direction as to favour the application of the food to the deranged surfaces. He would also be found to *quid*, as it is termed, or to partially chew his food, and then to throw it out of his mouth. Examination will likewise sometimes shew that a misapplication of one or more of the teeth exists, the effect of long and undue wear; the inner surface of both the upper and under grinders, but more particularly so of the upper, being worn away and bevilled, renders mastication difficult and incomplete; to remedy which, the animal endeavours to throw the wear on the outer edges, which occasions the peculiar inclination of head spoken of. It also sometimes happens that this uneven wearing leaves pointed prominences which penetrate the cheek by the increased efforts in the molar muscles to force the food in a new direction: mastication now becomes painful as well as difficult, and the horse refuses his food. This latter case may be commonly remedied by either the chisel or file; but when the misapplication of the general surface is considerable, it requires much care and pains to remedy the defect, which can only be done by using a very well tempered file, having first cast the horse and propped open his mouth. I have, however, succeeded by a daily application of the file without casting the animal; by which I fatigued myself less, and did not at all endanger the horse. Unless the process be very effectually done, it is surprising how soon the defect returns; and even when it has been very judiciously practised, one or two years is apt to renew the evil, except the horse be ever after kept on mashed food, grass, carrots, &c., when he may remain useful for a considerable time. An individual tooth which projects materially had better be altogether extracted, an instrument for this purpose, the invention of Mr. Surmon, is figured in '*The Veterinarian*,' No. 13.

The carious decay of the teeth, so common to the human subject, is infrequent in the horse; but extended experience has shewn that it is not altogether so much so as was formerly supposed. Mr. Percivall mentions a carious permanent molaris in his own possession, which he thinks must have occasioned intense pain; and Mr. Cherry had a patient with a discharge of discoloured pus from the near nostril, which being very naturally mistaken for glanders, the horse was destroyed. A post-mortem examination discovered a molar tooth with one-third of its fang eroded, and an abscess within its alveolus. I mention the circumstance as a hint to the veterinarian, that in all cases of nasal gleet, particularly when from one nostril only, he should look farther, for ulceration of the nasal membrane, and submaxillary swelling of the lymphatics, before he gives too hasty an opinion. The process of dentition is seldom attended with much pain, difficulty, or danger, in the horse or other herbivorous animals. It is not, however, infrequent, when the front nippers of the colt fall out, and are not immediately replaced by those of the next set, that he will be found to graze with difficulty. In the park of a nobleman, I accidentally saw two thoroughbred colts, of great estimated value, which were both in a state of considerable emaciation from this cause. They had been physicked for worms by a farrier, which increased the evil. I suggested the propriety of examining their mouths; when they were both found to have lost the front nippers, and much heat and inflammation attended the production of the new; which, though not very frequent, is not altogether uncommon. They were immediately housed, and, being well fed with mashes and succulent tares, soon recovered their condition.

A species of extra dentition sometimes takes place, and produces a small supplementary molar tooth, placed immediately before the first: when this happens to the milk or primary set, where it is most common, the growing up of the permanent molar tooth usually removes it; if not, it should be taken out. Another variety of this anomalous wolf's tooth of the farriers is produced when the second grinder does not rise immediately under the first, but towards one side of it; in which case, an imperfect absorption of the root of the milk tooth takes place, and, instead of being displaced, it is pushed to one side, and continues for some time to annoy the animal, and often to prevent his thriving, unless it be removed artificially.

THE BONY TRUNK.

THE osseous structure of the trunk comprises the spine, the pelvis, and the thorax or chest.

The *spine* is formed of seven cervical*, eighteen dorsal, six lumbar, and five sacral vertebræ, with the addition of an indefinite number of small bones of the coccygis, or tail, but which usually amount to about thirteen. The spinal bones are thus divided, on account of the varieties they present; but they have some characteristics in common, each being composed of a spongy considerable substance, named its *body*, and parts protruded therefrom, called *processes*. These processes unite to form a hollow, through which the medulla spinalis, or spinal marrow, is transmitted: they also furnish surfaces of articulation with each other, as well as by their bodies anteriorly and posteriorly; by which means the surface of attachment of these bones together is much increased, and the strength of the spinal chain is thereby rendered very great. Though but little motion is allowed between any two of these bones; yet the flexibility of the whole spine is considerable; by which wise contrivance the spinal marrow, nerves, and bloodvessels, are not liable to compression.

The *cervical vertebræ*, or neck bones (see *Skeleton*), are the largest of the vertebral chain. Their spinous process is indistinct; but on each side a considerable prominence branches out into two broad transverse processes: at the common base of these is seen a foramen for the passage of the vertebral arteries and veins. Each vertebra likewise forms a groove posteriorly, and this united to a fellow groove in its opponent, produces a hole which, communicating with the spinal canal, allows the cervical nerves to pass. (See *description of Skel.*). The vertebræ are each connected together by a round head, which is received into a corresponding cup-like cavity at the posterior part of every one but the first; and which union has articular cartilages, dense capsular ligaments, and all the appendages of a joint. It will be evident, from the strong means of articulation they have with each other, not only by the round head and corresponding cavity, but more particularly by their oblique processes, that no dislocation can take place between any of these vertebræ but between the first and second, in which case the animal inevitably dies from the compression of the spinal marrow; and which accident is what is usually called *breaking the neck*.

The *first* cervical vertebra *(a, vertebræ, Skel.)* would be improperly called *atlas*, as in the human, for here the head does not rest on it, but is rather pendant from it. Anteriorly it articulates with the occipital bone, receiving into its fossæ the two occipital condyles: on each side are two foramina, one of which transmits the vertebral vessels, and the other a pair of nerves. Posteriorly it articulates with the second cervical vertebra, receiving its odontoid process into its great cavity. This is the only one of the cervical vertebra to which the suspensory ligament is not attached: were it otherwise it would have interfered with its freedom of motion.

The *second* is named *dentata (d, e, f, plate of Skel. vertebræ)*, from a considerable tooth-like process inserted within the great cavity of the first. Instead of a spinous process, it has a longitudinal dorsal ridge, to which the cervical ligament is attached; its oblique processes blend together so as to appear a mere extension of its body: posteriorly they become more conspicuous, and articulate with the upper oblique processes of the third ver-

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* The vertebral chain of mammalia differs much in the number of its pieces as a whole; but its cervical portion almost universally follows the human type, in being composed of seven bones, whether the neck be as long as that of the cameleopard, or short as that of the mole. The antediluvian saurian tribes were otherwise formed, they having many more.

tebræ *(h)*, whose head is received into a cup-like articulating cavity in its body posteriorly. Its transverse protuberance also presents only a posterior point *(d, d)*, forming a single process on each side*.

The *third, fourth, fifth*, and *sixth* cervical vertebræ bear a common resemblance, and possess the general characters of anterior and posterior articular processes *(h, n)*; as well as of lateral transverse ones *(i, k)*. Each articulates anteriorly with the one before it by its head, and posteriorly with that which follows it by its socket. All these present foramina for the transmission of the vertebral vessels and nerves, like the first.

The *seventh (b)*, which is the smallest of the whole, presents transverse processes, small and not bifid, as those of the preceding; neither is it perforated by a foramen: its spinous process is more elevated than that of the others, and by its posterior oblique processes it articulates with the two first ribs, presenting at the back part of its body two semilunar articulatory cavities, which uniting with its fellow depressions in the first dorsal vertebræ, form appropriate indentations for the reception of the heads of the first and second ribs.

The *dorsal vertebræ* are eighteen (18 *Skel.*); occasionally there are nineteen. These bones do not essentially differ from each other except in the length of their spinous processes, which in the first seven or eight is considerable, for the purpose of giving a long lever to the dorsal muscles. It is these processes that give height to the withers; and as they are covered with muscles that act on them strongly, so their length is of great consequence to progression. Their four oblique processes are small, as well as their two transverse. They articulate with each other by their anterior and posterior surfaces, and by their oblique processes: each also articulates with two ribs on either side. As they advance in number, they increase in size, and are pierced by the spinal canal, and transmit by their lateral holes the spinal nerves; but they have no foramina at the base of their transverse processes. Between each is interposed a substance of the mixed nature of cartilage and ligament, which is most compressible at its sides, permitting the motion of the spine, and forming, by the solidity of its centre, a fulcrum or pivot for the bones to move on. This interposed substance loses its elasticity in the old horse, and becomes nearly ossified; to which we may attribute that stiffness in his rising up after lying down; and the want of that *springy* gait, as a horseman would term it, which is felt when on the back of the young horse.

The *six lumbar vertebræ* (1, 5, *Skel.*) have somewhat larger bodies than the dorsal, and broader spinous processes. Their transverse processes bear no comparison to those of any other vertebræ; being extended out to supply the place of the ribs, and to afford attachment to the muscles of the back: the last unites with the sacrum†.

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* The non-attachment of the cervical ligament to the first cervical bone, and the peculiarity of the articulation between the dentata and that, leaves an opening which exposes the spinal marrow, into which knackers and butchers, when they want to kill without effusion of blood, plunge a pointed knife, between the first and second *rack bones*, which, dividing the spinal medulla, instantly kills: this method is called *pithing*, at which the French are very dexterous.

† The foregoing description of the vertebral bones will shew the admirable mechanism of the chain for properties apparently in opposition, which are elasticity and strength. The cervical have much motion between them from the form of their articulation; and thus the neck enjoys ample liberty for the wants of the animal; but to compensate this it is strengthened by the ligamentum colli, or great nuchal ligament. On the first vertebra the head rotates with unlimited freedom; and this one moves very freely on the

The *pelvis.*—The trunk is bounded by a bony mass or irregular ring of great extent and substance, directed horizontally forwards and backwards, with a small intermediate posterior appendage named coccygis. These united masses are named the *pelvis* or *basin*, from their containing within their boundaries important viscera. The largest portions are formed by the sacrum and two ossa innominata.

The *sacrum*, which in the colt is formed of five pieces, or false vertebræ, in the adult horse is united into one bony mass of great strength, presenting a convex form externally, and a concave one internally, which is smoothed for the reception of the pelvic viscera. By an imperfect oval head it articulates with the last lumbar vertebræ, with the oblique processes of which it is also united by two articular surfaces ; a grove being formed between them, on each side, for the transmission of the last dorsal pair of nerves : its transverse processes are strong, and extend its whole length : the spinous are directed backward and downward. The spinal canal begins to diminish considerably in size in this bone, the medulla having parted with most of its substance to form the sacral nerves, which are transmitted through eight pairs of foramina at the under surface of the bone. Two articulary surfaces unite the sacrum with the ilium : posteriorly it articulates with the first coccygeal bone (*vide xx*).

The *coccyx*, or *bones of the tail*, vary in number : they are generally about fifteen (in the ass there are sometimes sixteen, seventeen, or even eighteen), which degenerate in their vertebral character as they descend; but the whole articulate with each other by true joints. The spinal canal, through which the medulla is continued under the name of *corda equina*, is purely bony in the first four or five of them only, being continued partly bony and partly ligamentous in the remainder.

The two *ossa innominata (a, b, c, d, e, f, g, Skel.)* are usually described as three pair of bones, though all the traces of their distinct existence are lost long before the adult period. In quadrupeds like the horse, ox, and sheep, not born indigent, but intended for early exertion, they are consolidated even at birth, and are only to be found separate in a fœtus of three months. The three portions of which the os innominata is early formed, are the ilium, ischium, and pubis. The *ilium (a, b, c, Skel.)*, which is the most considerable of these, is not rounded as in the human, but extends out into three distinct branches, by portions of which the haunches are formed *(vide a)*; and when these portions are more extended than usual, the horse is said to be *ragged hipped**. A tuberous spine, unlike that of man, extends

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second also. Motion is, however, more limited in the dorsal : between the lumbar it is rather less so ; but the length of their transverse processes is nearly equivalent with the straightness of the union of the lumbar. Thus the pieces of this admirable chain have very different degrees of flexibility between them, according to their several uses : and if the posterior portion of it is more confined than the anterior, as a whole it yet enjoys so much as to suffice for all the elasticities of an animal of great speed : while its strength is no less an object of our admiration, when we see the astonishing weights it will bear without dislocation ; strengthened as it is by numerous points of contact, and powerful ligamentous cords. The vertebræ of the spine in the horse very seldom take on spontaneous ulceration ; but they are liable to malconformation, the whole being sometimes curved upwards, and sometimes downwards, more than is natural. These bones are also liable to exostoses, to such a degree sometimes as to anchylose nearly the whole dorsal and lumbar joints.

* From a slight inspection of this portion of the pelvis, it will be evident that the rugged outline of the rump in cattle arises from the great prominence of the spine of the ilium, assisted by the extended tuberosity of the ischium. In the horse, the dorsum of the ilium is also large, and in some of his neglected breeds the tuberosity of the ischium, and the

from it, and articulates by its inner surface with the sacrum *(vide b)*, to which it unites by its posterior angle; its inferior branch terminates in the ischium.

The *os ischium*, or *hip-bone*, is a larger portion of the innominatum than the pubis, but a less one than the preceding *(e, f)*. It has three angles, and an inner and outer surface: by the anterior of these angles it unites with the ilium and pubis, and forms part of the *cotyloid cavity:* by its posterior it stretches back jointly with the superior to form a curved process, called its *tuberosity (vide f)*, which is very different to the same part in the human. Its superior angle is convex, and gives attachment to the sacro-sciatic ligament. Between the anterior and posterior angle it forms, jointly with the pubis, the oval cavity called *foramen thyroideum*, or *ovale (d)*.

The *os pubis*, or *share-bone (g g)*, is the least of the three portions: by its anterior edge it unites with the ilium, and, with its fellow, forms the *symphysis pubis*. On the outer and inferior part of these pelvic bones a cotyloid cavity or socket presents itself, lined with cartilage, and which is intended to receive the head of the femur. This articulatory cup is called the *acetabulum*, and is formed by the assistance of each of the above portions, but in unequal degrees; the pubis adds least, and the ischium most. The pelvic bones are strongly attached to the sacrum by the articulating surfaces we have described, and are held in these attachments by strong ligaments from the anterior and posterior edge of the articular part of the ilium, uniting it to the risings corresponding with the tranverse processes of the sacrum. From the foregoing description, the wise intention of the pelvis is displayed in its formation, which presents a complete cavity. The large posterior opening between the innominata and sacrum is filled up by two strong layers of ligament, which partially divide, to permit the pyriformis muscle, the sciatic nerve, and posterior crural vessels, to pass out of the pelvis. Thus the pelvic cavity has all its openings closed either by ligaments, muscles, or integuments, except an abdominal one before and an excretory behind.

The *thorax*, or *chest*, comprises the sternum and ribs. The *sternum* of the horse *(d Skel.)* so far from being a perpendicular flat pile of bones, like that of man, is inclined, and not dissimilar to the keel of a vessel, furnished at both ends with a cartilaginous portion; that of the posterior being considerable.

The *costæ*, or *ribs*, are long perpendicular bones, having one end attached to the spine, and the other connected with the sternum, either directly or inrectly. They are usually eighteen to each side, seven or eight of which articulate with the sternum, and are thence called *sternal*, or *true ribs;* while the remaining ten or eleven are connected together by intervening cartilages, and are called *asternal*, or *false ribs**. The central ribs are the longest, the others gradually decrease in length both towards the neck and loins. The first is placed almost perpendicularly, the second less so; and their curvature, as well as their inclination, increases as they advance, so as to enlarge the dimensions of the chest, till it becomes nearly circular (see *Plate of Skeleton)*. As they proceed towards the pelvis, their inferior extremity is carried backwards, which increases still more

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extension of the protuberant lateral branches of the ilium, give almost as deformed an outline to them also.

* The number of true ribs is not invariably the same: in some cases there are seven only; in many others a slight articulation is evident between the sternum and the eighth rib. When they exceed thirty-six, which is sometimes the case, the eighth is always a sternal one; and sometimes even the ninth is so likewise. In the Woolwich Museum an instance of forty ribs occurs. The number of costæ in the ox and sheep are eight true and five false.

the dimensions of the carcass, and strengthens the parietes of the abdomen. Each of them has a body, an upper and a lower extremity, and an upper and under surface. The upper extremity presents a small head (*a*), and a small tuberosity: the head articulates by two surfaces to the bodies of two vertebræ, and the tubercle with the transverse process of the posterior of these same vertebræ. The anterior edge of each has a groove for the passage of the intercostal vessels and nerve, which it is very necessary to be aware of in operations on the chest*. Above this, likewise, is a ridge from which the intercostal muscles spring, fixing themselves into the opposite edge of the next rib. The lower extremity of each rib is furnished with a firmly-attached cartilage, which articulates with the sternum in the true, and with each other in the false. Both above and below, the attachments of these bones are strengthened by powerful ligaments: each lower extremity is thus fixed into articular pits in the sternum; and each upper extremity is connected by articular as well as capsular ligaments. It must be evident that the ribs in the horse have but little motion, and that what they have must be forwards, particularly in those called the true, the first of which, so far from having motion, presents a fixed point for the rest to act upon; the false ribs can certainly be elevated considerably by means of the flexibility of their inferior attachment; and it is probable that such attachment was given for this purpose. But the motion thus afforded could not have been sufficient to enlarge the chest during inspiration, without a very moveable diaphragm†.

The Anterior Extremities.

These bear but little resemblance to the human arm, particularly in those quadrupeds, as the horse, who have but one phalange: in those with several, the resemblance approximates much more, till in the fore extremities of the ape they differ little but in the thumb, which forms a bad antagonist to the fingers. It appears a very wise provision of nature, to have given a colt very long limbs at birth, that the form of parts might not be much altered in their future evolution; but, at the same time the hinder ones are by much the longest; because, were the fore equally so, the young animal would have been too much elevated from the ground, and rendered incapable of grazing, or even of sucking conveniently.

The *scapula* or *shoulder-blade*, is a broad and rather triangular bone, applied to the chest, so that its apex reaches between the first and second ribs, and the posterior part of its base as far as the seventh*. It is, therefore, situated obliquely, with its broadest portion above, and its tuberous extremity below. Its internal surface is flat and smooth, and its external is divided into two unequal portions by its spine. Its anterior edge (*m, i, Skel.*) as it continues down, contracts inwards, and ends in a blunt rounded extremity, called in the human its *coracoid process*, but which in the horse is not very beak-like; on the contrary, the horse cannot, strictly speaking, be said to have either a coracoid, acromion, or recurrent process. Its superior surface is furnished with a considerable cartilage, strongly adherent by ligamentous fibres; by which the surface of muscular attachment is much increased, yet with little addition to either weight or bulk. The posterior edge of the scapula inclines inwards, and ends in its cervix, or neck, presenting a superficial excavation to receive the head of the humerus or arm, called its *glenoid cavity (vide e)*. The spine *(vide h)* divides the external surface into two portions: as it proceeds downwards it forms a rounded extremity, and not a sharp process, as in the human; for in the horse, there being no clavicle to articulate with, such formation would have been useless. The two portions formed by the spine are called the *antea* and *postea spinatus fossæ*. The former *(f)* is the least and most superior; the latter is the larger and most inferior *(g)*†.

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* In operating for paracentesis, unless the opening were made in a direction which approximated the posterior edge of the rib, there would be great danger of dividing the intercostal artery.

† The thorax of the graminivorous quadrupeds could not have been formed as the human without detracting from the ease and stability of motion; hence, to approximate the fore extremities, it was necessary to flatten the chest: yet a posterior expansion of this cavity is not only allowed, but required, and is as essentially necessary to the horse as to the man. The greater convexity the ribs have, and the more cylindrical is the form of the chest posteriorly, the more favourable it proves not only to respiration but to chylification; for, as the belly usually partakes of the form of the chest, so a flat-sided horse is generally without much carcass also. It must, however, be observed, that the chest may have great capacity by its depth also: and such a form of it actually seems the best adapted for animals of speed, as already remarked on with regard to the racehorse and greyhound. But where hardihood and a ready separation of nutriment are studied, the circular form (although when carried to an extreme it detracts from the perfection of the fore extremities by removing the scapulæ distant from each other, and constituting a *thick shoulder*) is the most advantageous.

The *(os humeri) humerus*, or bone of the real *arm*, is strong, short, and very unlike the same bone in man. It extends from what is called the point of the shoulder to the elbow *(n, o, p, q, Skel.)* forming an angle with the scapula, extending obliquely backwards, as the shoulder does obliquely forwards. At the posterior part of the upper extremity it stretches out into a round head, supported on a cervix *(n)*, with a circular fossa surrounding its base, for the insertion of the capsular ligament: this head is received into the glenoid cavity of the scapula. The anterior part of the extremity is usually but improperly termed the point of the shoulder *(o)*, and has three prominences, into which the extensor muscles of the arm are inserted:

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* Mr. Percivall remarks, that Stubbs, and other delineators since his time, have represented this bone higher than it is naturally placed, as well as less oblique in its situation. In this observation I believe Mr. P. is correct, and the fault originates with the articulator; as such, I am disposed to think that my own figure is not wholly exempt from this error. The correctness of the general degree of obliquity (for it varies considerably in different horses) is, I believe, perfect in my representation of it, and the height also nearly so.

† The different situations of the æquine and human scapulæ must at once strike the observer. It has been very justly remarked, that the horse presents no proper back, for the withers can hardly be considered as such. This bone in the horse does not pass out of the plane of the os humeri, whereas in the human it forms an angle with it: and by the absence of a clavicle, the attachment of the scapula to the chest is muscular only. It has neither bony nor ligamentous union, unless a strong aponeurotic expansion from its cartilaginous base can be so considered; it is however powerfully attached to the chest at its inferior part by the serratus major, and by the pectoral muscles also. By a muscular attachment only, the scapula enjoys much greater motion round its centre than it could have had, had there been a clavicle to confine it. Its usual situation is, to a plane perpendicular to the horizon, under an angle of thirty degrees; and it has a motion, in its greatest extent, of about twenty degrees; hence, as it does not pass beyond the perpendicular backwards, so the more oblique its situation, the greater number of degrees in the circle it can move through; and in the same degree it can assist the action of the humerus, with whose angle its own is commonly consentaneous. The muscular attachment of the blade-bone greatly favours the elasticity of the whole extremity, and at the same time is so strong, that a glenoid cavity is fully able to protect its articulation: thus a dislocation between the scapula and humerus is even less frequent than between the acetabulum and femur.

between the two anterior of these processes the tendon of the flexor radialis anticus passes, secured by a cross ligament. This tendon, almost of a cartilaginous hardness, is flattened out into a species of patella to this articulation, effectually preventing any dislocation of this joint forwards; which is the only point in which it would otherwise be at all probable. The body of the humerus presents an external and internal tuberosity, for the insertion of the adductor and abductor muscles: when proceeding downwards, it terminates in an inner and outer condyle *(q)*, which are received into articular cavities in the superior extremity of the radius; thereby confining the motions of this joint to flexion and extension. In the front of this extremity is a cavity to receive the protuberances of the radius, in the greatest flexions of the fore arm; and behind there is a very deep depression for the reception of the olecranon or elbow, when it is again extended. The humerus is attached to the scapula by a capsular ligament, which passes from this bone to the cervix of the scapula; over which are spread, both externally and internally, strong ligamentous layers which stretch from one bone to the other*, and powerfully bind the articulation.

The *fore arm* is composed of the *radius* and *ulna (s, r, Skel.)* in the young subject, but which become so intimately united in the old horse, as to be by some, and without any great impropriety, described as one bone†. In common parlance, the site of these bones is known by the terms *arm* and

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* The mechanism of this bone, and its articulation, are well worthy of consideration. It has been said that it cannot be too short, because thereby it brings the fore legs forward; but we are disposed to think that the benefits of safety and celerity of progression are best accomplished by a humerus of sufficient length, but *one of great obliquity of situation.* When, however, its length is inordinate, it necessarily does bring the legs of the horse too much under him; and it unfortunately happens that this defect is too often accompanied by an upright and short shoulder. Its scapular articulation, without peculiar provision, would be weak, from a glenoid cavity only as a recipient of its head; but its powerful bindings, and its patella-like cap, secure it fully. Below, its articular surfaces owe much of their security to the dove-tailing between the opposed bones, which is such as to render it perfectly secure. The humerus is confined in its motions to being brought from its inclined position backwards to a perpendicular one of the limb *in situ* forwards.

† Bourgelat describes the radius and ulna as one bone, under the name of cubitus. La Fosse speaks of them as two bones, radius and cubitus. Cubitus, in veterinary authors, is sometimes applied to either bone, because in the human these bones are nearly of a length, and not far distant from the measure of a cubit; but as this will not apply to either of these bones in the horse, the term ought to be rejected entirely. A comparison between the human and brute osteology here exhibits many specialities, and in none more than the ulna, which is always so formed as best suits the habits of the animal to which it belongs. In man, the *elbow-joint* will be found to be a complex and curiously contrived piece of mechanism; and that in him the *ulna* instead of being a mere appendage to the radius, is, in fact, the larger bone of the two, receiving above, a tubercle of that bone, whilst below it is the radius which furnishes the articulatory cavity, and the ulna supplies the tubercle; by which formation the human hand enjoys fully the rotating motions of pronation and supination; the radius moving on its own axis at the upper end, and revolving round the ulna at the lower. In the canine, feline, and some other tribes, where the paws are used in some measure as prehensile organs, the ulna is also found sufficiently perfect for variety of motion; but in the horse and the ruminants, where a supine state of the limb would have been inconvenient, it shrinks into a mere process, not moving on the radius, but is anchylosed with it, by which firm union great strength is gained. Nor would the safety of this important part have been studied without such provision; for the immense lever of the extended process of the olecranon would have endangered any other opposition of it, without thereby gaining any advantage, its motions being confined to flexion and extension, as the member it belongs to is principally employed in progression. Support and progression, therefore, being in the horse expected from the fore limbs, they exhibit every contrivance to increase their strength, without destroying their elasticity or increasing their bulk.

elbow. The *radius* is the long cylindrical portion composed of a body and two nearly equal extremities. The superior end is flat, and receives into its articular depressions the condyles of the humerus: it presents anteriorly tuberosities for the attachment of muscles, and posteriorly an articulating surface for the ulnar portion of the bone. Its body is slightly convex anteriorly, and its inferior extremity is furnished with four eminences, covered with cartilage, which articulate with the first bones of the carpus or knee. The anterior part of this extremity is depressed with the sinuosities which receive within them the tendons of the extensor muscles of the foot*.

The *ulna* is articulated in the young horse to the posterior and superior part of the radius by intervening cartilages, and by strong ligamentous fibres: stretching downwards (see *Skel.*) it is unattached, and permits vessels to pass between it and the radius, till it has reached the middle of that bone, when it terminates in a point. In the older horse, the intermediate cartilages of these bones become absorbed, and ossific matter is thrown out in their stead, which forms an anchylosis between them. The ulna stretches out superiorly into a powerful process covered with cartilage, received into the great posterior fossa of the humerus; from which the whole extends backwards to form the *olecranon*†, the whole surface of which is rough, for the insertion of the strong extensor muscles of the fore arm.

The *carpus*, or *knee*, (as it is universally called in the horse) following the human anatomy as our type and guide, must be the same with the wrist in man. It is therefore evident that one or the other of these terms must be a complete misnomer; and this forms another of the many instances wherein a blind adherence to the human anatomical terms is attended with inconvenience, begets confusion, and propagates error. In the articulated skeleton there are *seven* principal carpal bones; but in the recent subject there is commonly, but not invariably, found an additamentary osselet of the shape and size of a pea, situated behind the trapezoid, with which it is sometimes articulated, and at others simply adherent: when it exists, it certainly more properly deserves the name of *pisiform* than that of trapezium‡. Independent of this, the carpus consists of seven bones ranged in two rows: the upper articulates with the inferior extremity of the radius, and commencing from the inside of the row, first presents the *scaphoid* (2, 2). It is the most considerable of the row, and articulates with the internal condyle of the radius anteriorly, and laterally with the lunar; so that the scaphoid and lunar are placed over the magnum in front of the knee, as, in building, two bricks are placed so that their line of division is over the centre of a third, by which means great strength is given to this articulation: it likewise articulates inferiorly with the trapezoid. The *lunar* is the second bone of this row (3, 3), articulating above with the middle and anterior part of the radius, below with the magnum and cuneiform, and laterally with the scaphoid and cuneiform, and by a small posterior point to the trapezium. The *cuneiform*, the outer bone of the first row (4), articulates above with the external condyle of the radius; posteriorly with the trapezium; below with the unciform, and laterally with the lunar. The trapezium* (1, 1,) projects posteriorly on the outer side of the superior row, so as to give a greater power of attachment to muscles, and to raise the ligaments of the knee from compressing the tendons; but it takes no part in supporting the weight of the machine. It articulates with the outer and posterior part of the radius by one surface, and by another to the cuneiform. The *trapezoid* (7) is the first and smallest bone on the inner side of the second row, and is situated at the posterior lateral internal part of the knee, articulating above with the scaphoid, below with the internal small metacarpal and a small part of the cannon, and laterally with the magnum. The *magnum* is the middle bone of the second row (5, 5), and the largest of the whole, receiving above the scaphoid and lunar, and resting below on nearly the whole of the surface of the large metacarpal or cannon bone: it articulates at the lateral internal part with the trapezoid, and at the lateral external with the next bone. The third and most external of the second row is the *unciform* (6), which rests upon the external small metacarpal, and in part upon the great metacarpal; and articulates above with the cuneiform, and laterally with the magnum†.

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* It is observed in all speedy animals, that the length of this bone is very considerable: in the hare and greyhound, the knee approximates the ground; and a long fore-arm is found by experience to be equally favourable to celerity of motion in the horse also, and for such purposes legs so formed are by good judges always preferred. It has also elsewhere been stated, that the parts below the knee appear to be bent in progression, principally to receive the weight of the machine, but not to add to the extent of its progress; and allowing that the extent of the stride is effected by the parts above, it follows that the longer they are the better.

† On the slightest inspection of the skeleton, it will appear how much the motions of the fore extremity must depend on the length and obliquity of this process; which, operating on the principle of a lever in the extension of the arm, must necessarily act in the ratio of its length and strength. The ulna and radius are articulated with the humerus by a very extensive capsular ligament which takes in the whole articular surface. This articulation is strengthened by an external and internal ligament, extended from the condyles of the humerus over the head of the radius, and likewise by powerful tendinous and aponeurotic expansions spread over the whole, by which means this joint is wholly prevented from dislocation: but the olecranon has been found at times fractured; under which circumstances, from the great strength of the muscles implanted into it, a proper and complete apposition of the fractured extremities would be extremely difficult. Punctured wounds likewise sometimes happen in this part, when, if motion be kept up, a large quantity of air becomes absorbed, forming extensive emphysema. Both these bones are occasionally the subject of deformity, and are likewise now and then affected with exostoses.

‡ Mr. Percivall has very correctly observed that it is erroneous to call a bone of the shape and size of a pea, *trapezium*, or a large quadrilateral one by the name of *pisiformis*.

It is not a little singular, that among the French authors equal discordance exists on this subject; hardly any two of them naming the carpal bones alike. Bourgelat describes them as nine in number; but says little more of them; nor does he, if I remember aright, attempt to name them at all.

* Although trapezium is by far a more appropriate name for this bone than its former one of pisiformis, I am still in doubt whether that of posticum, as called by Mr. Clark, is not more so.

† The carpal bones are covered with cartilage on their articular surfaces, and such as are non-articular are rough for the attachment of ligaments, which connect them so closely as to allow but little motion between any but the first and second row; enough, however, is allowed between the whole to prevent concussion when the foot strikes the ground. The capsular ligament is here very extensive; arising from the inferior extremity of the radius, passing to the first row of bones, to which having attached itself, it proceeds more loosely to the second, from whence it is continued onwards, investing the superior extremities of the large and small metacarpals. Within it, is secreted a large quantity of synovia, the escape of which, and the inflammation of the surface from whence it is secreted, renders deep wounds of the knee very dangerous. Besides the capsular, there are also several other layers of ligamentous fibres, some of which are applied to the bones; others are more loose, and stretch over the tendons to form annular bands. The carpal ligaments and tendinous attachments have many of them individual bursal cavities. In the case of broken knees, it sometimes happens that one of these being opened, leads the junior practitioner into a supposition that it is the cavity of the joint which is exposed, and his prognosis is apt to be false. Each bone likewise has individual fibres connecting it to the bones with which it is attached, forming, on the whole, a most complex ligamentary binding, greatly strengthening the knee joint, and preventing a possibility of dislocation.

The *metacarpus (os metacarpi magni, t, t)*, or what is termed the *cannon* or *shank*, is formed of a large metacarpal bone and two small ones, which the French term styloids or perones. The *cannon* is a plain cylindrical bone, having its two extremities rather enlarged, the superior of which articulates with the second row of the knee, particularly with the os magnum: posteriorly its head is indented into two surfaces, receiving the small metacarpals. Its inferior surface is formed into two condyles, divided by an eminence, by which it articulates with the pastern and sessamoids in a manner that preserves the utmost freedom of flexion and extension, yet denies any lateral motion which would have detracted from the necessary great strength of the joint. The small *metacarpals (ossa metacarpi parva, vide u, u)* are placed one on each side of the posterior part of the cannon, each having a superior articulating surface uniting it with the carpal bones, and likewise a surface of attachment with the upper extremity of the cannon; to which they are, above, intimately united by intervening cartilage and ligamentary bindings. As they proceed downwards they taper, and are less closely united; terminating at about two-thirds the length of the cannon, by an unattached button-like extremity[*].

The *pastern bone (os suffraginis*[†]*)* is the first of an oblique pile, which

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The mechanical advantages of this assemblage of bones must be at once evident; for, not only as a surface of attachment for ligaments and muscles is it favourable to motive power and strength of connexion, but it acts most advantageously as a spring placed between the two solid perpendicular arms of the radius and cannon, by which concussion is divided and distributed among the bones, or, as it were, carried over an extended and contiguous, but not continuous surface. That such is its principal use, we learn from the fact, that in animals not designed for quick or long-continued exertions, as the ruminants, these bones are less numerous, and the joint altogether less favourably formed; as another instance of which inferiority, we may observe the os trapezium in them is small and less prominent than in the horse.

[*] The small metacarpals are attached to the large by a strong aponeurotic expansion, which will be described with the extremities; but they are more immediately connected with the large metacarpal bone by strong appropriate ligamentous fibres; yet not so closely but that they have some motion, and hence can descend, or in some degree yield, when pressed upon by the bones of the knee; and which appears one of their principal uses. The *internal* receives the weight of the trapezoid, and the *external* part of that of the unciform, by which the general elasticity is increased. But as the animal grows old, and his exertions become greater than his strength, so nature, sympathising with the general weakness of the parts, unites the sessamoids or splint bones with the cannon by an unyielding ossific union, which deprives them of any spring-like property. In young horses also, ligamentary inflammation often ends in bony union between them, which forms what we term splint; and as it is usual to raise the outer heel of the shoe, by which means an undue share of weight must be thrown on the inner small metacarpal, so this has been thought to be the reason why splint is generally confined to the inner side; but perhaps this will not wholly account for this partiality. On the contrary, there is reason to believe that the natural form of the parts likewise gives a tendency to it; for we find that the weight of the carpal bone, pressing on the outer small metacarpal, is divided between it and the cannon; but that the internal small metacarpal receives nearly the whole weight of the trapezoid. Under this view of the matter, which I believe a careful inspection of the parts will shew to be correct, it is not easy to agree with those comparative anatomists who consider these bones are mere styloid appendages, intended only to keep up a harmonic connexion between the horse and the digitated animals; although, without doubt, this is a part of their intention. These bones are now and then fractured; and both the large and small metacarpals are occasionally the subjects of extensive exostoses.

[†] For the sake of uniformity with accredited authorities, I have, in this edition, introduced this name for the pastern bone; although I am not quite satisfied that it is sufficiently critical for an improved nomenclature; as the objection I raised to it in the last edition still influences my opinion somewhat. This was, that *suffrago* is equally, or indeed more, applicable to the hock than to the pastern. Columella, in recommending washing of the legs, desires that the hinder may be wetted to the hocks, '*Laventur pedes*

terminates the extremities of the horse. The great pastern bone, as it is sometimes called, is cylindrical, and inclined obliquely forward *(v, v, Skel.)*. Upon its length and obliquity the ease and elasticity of the motion of the animal greatly depend: nevertheless, when these properties are very considerable, it must require a corresponding effort in the tendinous and ligamentous parts to preserve it in its situation; and thence very long-jointed horses are weaker, and more liable to become strained than others. Its superior surface receives the greater part of the inferior surface of the cannon: posteriorly it articulates with the sessamoids, and inferiorly with the coronet or small pastern. The body of the bone is much smaller than its extremities. Its ligaments are the capsular, the lateral binders, and the suspensory, which does little more than slide over it, yet serves to assist in preventing dislocation.

The *sessamoids (w, w)* are two small wedge-shaped bones, situated at the point of the fetlock, exactly opposed to the posterior and inferior part of the cannon, and to the posterior and superior part of the great pastern bone, with both of which they articulate very closely by depressions suited to the prominences of those bones. With the cannon the connexion is very close, by means of an elastic ligament, by which, and the nature of their situation, they support a portion of the stress and weight of this bone. They are placed side by side, with their thinner portion pointed upwards, and their thicker and more obtuse part below, by which portion they are firmly attached to the pastern bone by strong ligamentous fibres, as well as by the suspensory ligament. Between them a hollow is left, invested with a bursal capsule, through which the flexor tendons slide with freedom and security*, at the same time that they embrace them firmly.

The *lesser pastern*, or *coronet bone*, receives the great pastern, its largest

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& deinde suffragineo:' and he has again, '*equus suffraginosus*,' a spavined horse. I have also discontinued Stubbs's term of phalanges to these bones, although sanctioned by M. Girard; for it must be owned that, however appropriate phalange may be to the human digitated hand, which presents a phalanx (φάλαγξ) of bones, yet a cylindrical pile of single pieces, like the foot of the horse, can hardly deserve the appellation by even forced analogy. In the digitated animals, as the monkey, cat, dog, &c. a true phalanx of bones is met with, as in man, although somewhat degenerated. The thumb of even the monkey is but an imperfect antagonist to his fingers; while the additamentary or dew-claw of dogs and cats is still less useful. The cloven-footed have two perfect and two imperfect phalanges; the whole-hoofed has one only; and thus it is that some naturalists still use the term phalange; inasmuch as although the whole-hoofed animals concentrate the mechanism of the extremity in a single toe, yet there are still added to it two imperfect but sufficiently well characterised metacarpals.

* Small as these bones are, they are important aids to progression; and the mechanism displayed in their formation and dependencies excites our admiration. To Professor Coleman we were first indebted for a precise and accurate account of their action. Mr. Percivall's descriptive language has also further tended to enlarge our views on the subject. Principally attached by their inferior portions, their upper parts are left in some measure free, by which they act the part of a hinge to whatever rested on them, receding backwards when pressed on by the cannon in the motions of the animal. The cessation of the impulsive force (i. e. the weight of the machine) necessarily replaces these bones in their former situation, and thus they may be considered as acting the part of *true springs* in the motions of the pasterns, on which the elasticity displayed in action principally depends, and consequently the grace and freedom of it also. Under these views, we account for the great ease experienced by the rider of a horse having long oblique pasterns, which operating on the angle formed between the two opposed members of this joint, places the sessamoids more under the centre of gravity, and enhances the spring of their return. Thus the improved breeds of horses, in which these peculiarities of formation are prevalent, are easy, graceful, and pleasant; while the contrary formation of short upright pasterns, so common among cart and most low-bred horses, renders quick progression uneasy to their riders and hurtful to themselves.

extremity being placed below; it presents an inferior, an anterior, and posterior surface; but cannot be said to be square *(x, x)*. Its anterior eminence is received into the anterior and inferior depression of the large pastern; posteriorly the upper surface is formed into two depressions, receiving the pulley-like surface of that bone. Inferiorly it terminates in two similar surfaces, and an anterior depression, corresponding with the anterior eminence of the coffin bone. It likewise articulates with the navicular bone by two depressions which receive the navicular prominences when the joint is fully extended: at its upper extremity it receives the capsular ligament of the pastern, as well as strong ligamentary fibres on each side: inferiorly, besides its capsule, it receives the ligaments of the navicular bone, as well as an appropriate ligamentary junction with the coffin.

The *coffin bone* is a very peculiar one (*y*). In shape it corresponds with the hoof, which, with its appendages, it fills: in structure it is very porous, having its bony fibres perpendicularly placed so as to give it a rough linear appearance, particularly at the lower part. When viewed in front, an eminence is seen at the upper part, to which the tendon of the extensor pedis is attached: its lateral parts are not so high, but project farther back, and form two lateral processes, which are not however always distinct. In the lower of these processes, or otherwise between the two, a considerable branch of of an artery passes from the posterior part; traversing around two-thirds of the semidiameter of the bone, and being then ramified within it and its laminæ. There is usually likewise a lower lateral groove, from which a branch of this upper trunk proceeds to furnish the under surface of the bone. Above the lateral processes is a concavity which receives the lateral cartilages of the foot, and gives attachment to the capsular ligament likewise. Around the outer surface of the coffin bone are placed the sensible laminæ, which, indenting themselves between the linear asperities, become strongly attached. The inferior surface of the coffin bone has two concavities; the anterior of which has no foraminæ, and is covered by the sensible sole: the posterior surface appears hollowed out of this, and a rising line shews the extent of attachment of the perforans flexor tendon, which strongly implants itself into the remainder of the surface. Two grooves that lodge two considerable arteries indent a part of this concavity; and immediately under the flexor tendon, ligaments are also attached to it: above this is seen an articulatory narrow surface for the reception of a correspondent one on the navicular bone. Beside the foramina particularized, numerous smaller ones perforate it in every direction, giving free passage to nerves and bloodvessels. The upper surface of the bone presents two articular depressions divided by a rising line continued from the anterior eminence, which are covered with articular cartilages. (*See plate* IX, where this bone is represented.)

The *navicular*, *nut*, or *shuttle bone*, is situated at the posterior part of the coffin, to which it is articulated, as just noticed: its upper surface forms a continuation of the articulating surface of the coffin, by which these bones jointly receive the broad extremity of the little pastern. The navicular bone is, as it were, laid upon the flexor tendon, which passes up over its posterior edge (*vide plate* IX): all which parts will be more particularly considered when we describe the feet (*vide z, z; y, y*).

The Posterior Extremities.

These differ much from the anterior, not only in the strength of the parts generally, but in the length and direction of the bones entering their formation.

The *femur*, or *thigh bone*, is the largest, thickest, and strongest in the whole body. It is, however, short in the horse, as compared with that of most other animals: its surface exhibits risings, asperities, and indentations for the attachment of the most powerful muscles[*]. From its upper extremity extends the *cervix*, or *neck* (*h*), supporting the *caput*, or rounded *head*, by which it is articulated with the acetabular cavity of the pelvis. Within the head is a cavity, giving origin to a *flat* ligament (although sometimes called *round*), which being implanted in the acetabulum, retains the head of the bone very strongly in its situation: below the head is a linear asperity for the insertion of the capsular ligament; and from the inner part of the cervix a ridge extends down, in the middle of which is a process (*l*) called the *internal trochanter*. On a line with the caput or head, is a large depression receiving the tendons inserted into it. From this, the bone is stretched up into a very tall epiphysis (*i*), called its *great trochanter*, which is curved forward, and by its form affords attachment for the gluteus maximus: below, there is a considerable tuberosity, called the *small external trochanter;* and under this, there appears on the outer side a curved process, peculiar to the horse, called the *lateral external trochanter* (*k*)[†]. The body has two flattened surfaces, one situated posteriorly, the other at its lateral and external part: its inferior extremity terminates in four large condyles. The anterior unite to form a surface on which the patella slides (*m*, *m*): the posterior (*n*, *n*) have a cavity behind them in which the crural vessels pass protected from pressure.

The *patella*, which is called by farriers the *stifle* (*o*, *o*), is nearly angular, and has an anterior rough concave surface to which ligaments are attached, and an interior which is cartilaginous, adapted to the convexity of the femur and tibia. The patella has some of the tendons of the strongest muscles of the thigh inserted into it, which are from thence continued over to the tibia; by which the importance of this bone in assisting the motions of the leg and giving power to the muscles of the limb must be evident. It is attached in its situation by the strong muscles implanted into it above, and a ligament from its lower part, united with an expansion of the rectus tendon stretched over and fixed into the depression at the head of the tibia[*].

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[*] The femur of the horse does not, as in man, appear beyond the parietes of the abdomen, but, being hidden within the skin, is apt to be overlooked, and the next bone is, therefore, in horseman's language, called the thigh. In this situation it differs also from the human type, in not being curved outward: on the contrary, its body is straight, though oblique in its direction, being elevated so that the patella falls within the line of the haunch at an angle of 45 degrees. The upper extremity of the femur articulating with the pelvis is called the *whirl* or *round bone* by farriers; and is held in its situation, first by the flattened ligament we have described, next by a strong capsular one, and, lastly, by the large muscles surrounding the joint: nevertheless, powerful as is this articulation, this bone is now and then dislocated; though a violence of such magnitude more usually fractures the head from the neck of the bone. Like most of the other bones, it is subject to exostoses. In the dog, cat, and many lesser animals, whose limbs are capable of diversified motions, a small bone is commonly attached to the external condyle, but which is wanting in the horse.

[†] Every part of the os femoris of the horse betrays marks of the great powers required of it. This process, which gives attachment to the vastus externus, fascia latæ, and m. f. glutealis muscles, is wanting in the ruminants, as well as the greater number of quadrupeds, and is called by Stubbs the protuberating part of the linea aspira.

The *tibia* is a large bone situated within that part popularly called the thigh, but which, speaking with analogy to the human, is properly the leg (*q*, *q*). It is formed of a large epiphysis called its head, and a small attached pyramidal part termed the fibula (*r*, *r*), which is altogether wanting in the ruminants; while the dog and cat possess a very perfect one, for the purpose of extending the motion of their hinder limbs, and increasing the surface of the lower digitated articulations in them. Its inferior extremity terminates also in an epiphysis, which is furnished with articulating protuberances termed *malleoli*. *In situ* it will be found placed obliquely backward, as the femur is obliquely forward; forming with that bone an obtuse angle. The superior extremity presents an anterior flat protuberant surface, receiving the patella in the flexions of the limb; it has likewise an upper surface with two slight articular fossæ, separated by a rising edge, which enters between the condyles of the femur. On this surface the semilunar cartilages are placed (*p*, *p*), and in a hollow formed for this purpose lodges the cervical ligaments; and behind are seen the popliteal vessels in an appropriate cavity surrounded by fat. The body of the bone is nearly triangular; the anterior angle of it is called its spine, and forms the human shin. The inferior extremity is formed into three considerable protuberances, and one lesser, which correspond with the pulley-like surfaces of the astragalus; the risings of the one being received into the depressions of the other, so as to unite to form a very strong articulation[†].

The *fibula* in the horse is nothing more than an epiphysis to the former bone, but which forms an indissoluble union with it by age. It appears more designed to keep up that beautiful connexion we observe throughout animated nature, than for any great use in the machine. It is attached by a cartilaginous surface to the lateral superior and posterior part of the tibia, with its base upwards and its point directed below (*r*, *r*); reaching a quarter of the length of the tibia, to which its lower point is attached.

The *tarsus* or *hock* (*vide Skel.*) is a most complex and important joint; and though it contains six bones[‡], these are so intimately united as to appear a solid mass. The *astragalus* or knuckle bone, which is the first and largest of the tarsal range, presents a very irregular figure (3, 4; 3, 4). Its upper and anterior surface is pulley-like, having two remarkable circular risings with an intermediate depression, which articulate with the malleoli of the tibia. Posteriorly it has several surfaces of attachment with the calcis, receiving the eminences of that bone into considerable depressions: inferiorly it has similar surfaces for articulation with the great cuneiform, upon which it rests; and posteriorly at the lateral external part it has a surface of attachment with the cuboid. The *calcaneum, os calcis*, or *hock point* (1, 2; 1, 2), is placed nearly behind the centre of the joint; into which important point the tendo Achilles, or twisted tendons of the gastrocnemii muscles, are inserted: the longer therefore is this process, the longer is the lever these muscles have to act by; and a very slight increase or diminution in the length of this bone must enlarge or lessen the power by which the motions of the joint are operated. It is by this tendon that the limb, having flexed the angle between the cannon and the tibia, is enabled again to open it to operate the phenomena of progression. The calcaneum is not placed so as to rise exactly from the centre of the joint, but rather externally; and this formation leaves a space on the inner side, by which the flexor tendons of the foot, with vessels and nerves, pass protected from pressure; inferiorly it articulates by a concave cartilaginous surface with the cuboides, and anteriorly it is received into the depressions of the astragalus. The remaining bones are more wedge-like, and principally serve to increase the surface of attachment. The *large cuneiform* (5, 5), or great wedge-like, is placed under the astragalus, and articulates with it by a concave, while inferiorly by a convex surface it rests upon the middle wedge-like: posteriorly its internal, as well as part of its inferior surface, articulates with the cuboid, which Mr. Stubbs calls the navicular: it has likewise posteriorly and inferiorly a small surface of attachment with the little cuneiform. Immediately behind this, on the outer side, appears the *cuboid* (6); articulating by its cartilaginous surface, superiorly, with the inferior concave surface of the calcaneum, receiving the inferior posterior edge of the astragalus, and resting inferiorly on the external small styloid or metatarsal bone, and part of the cannon: it has likewise two surfaces of attachment with the cuneiform magnum, and one with the medium. The lesser or inner cuneiform (8) is situated most posteriorly on the inner side, immediately under the posterior internal part of the cuneiform magnum, and over the internal small metatarsal bone. It articulates by a small upper surface with the next bone, projecting rather forward, to rest partly on the cannon; but its principal portions articulate with the great cuneiform superiorly, and with the internal small styloid or metatarsal inferiorly.—The *cuneiform medium* (7, 7). The greater part of this bone appears on the front of the hock, articulating by its superior cartilaginous surface with the great cuneiform, and inferiorly with the whole head of the cannon, or great metatarsal. It is slightly triangular, with its acute part pointed posteriorly, and articulates by a posterior lateral internal surface with the cuneiform parvum, and at the lateral external part with the cuboid.

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[*] The patella is liable to dislocation, although the occurrence is rare *(see Dislocations)*. It is also open by its situation to violent blows, which contuse the parts around; and they, being mostly tendinous, ligamentous, and bony, the lameness produced is not only great, but the recovery slow; which the brutal attempts often made to *work* the poor animal *sound*, make more so.

[†] The articulation of the tibia with the femur presents a glenoid cavity; consequently this joint requires strong ligaments, or a dislocation might easily take place, and which on a superficial observation would appear very probable; but so perfect is the mechanism here displayed, that I never heard of an instance of it. The *semilunar cartilages*, by being thick on the outside and thin in the middle, increase the depth of this otherwise superficial joint; but the principal strength of the articulation is derived from its ligaments, which are a capsular, lateral, and crucial. The capsular is extensive, and completely invests both extremities of the bones forming the joint. The crucial ligaments arise within a depression in the articular surface of the tibia, which crossing each other are inserted into the posterior part of the condyles of the femur. The lateral ligaments are an external and internal, arising from the condyles of the femur, and being inserted into the head of the tibia.

[‡] Now and then, by a division of the internal cuneiform, there are seven tarsal bones.

Though the bones of the hock have all cartilaginous surfaces, yet they have but little motion except between the tibia and astragalus, and this is confined to flexion and extension. Each of them has peculiar plans of fibres, stretching from one to the other in every direction, by which means they are individually joined together. The capsular ligament arises from the inferior extremity of the tibia, proceeds backward to insert itself into the calcaneum behind, and before into the ridge of the cannon; besides which, the lesser bones have also peculiar capsules. From the malleoli on each side arises a strong common ligament extending laterally over the joint, firmly fixing itself to the bone in its passage: a continuation of its fibres forms likewise the annular ligaments, under which the tendons insinuate themselves in their passage. A short plane also of strong fibres extends from the inner and outer sides of the tibia into the astragalus; and a still stronger layer from the calcaneum passes over the cuboid and cuneiform medium, which, uniting with the small metatarsal and posterior part of the cannon, covers all the back part of the joint. It is the tumefaction of this ligament which occasions the diseased enlargement called curb*.

The complexity of this joint, and the great powers required of it, render it, however, very liable to disease and derangement; and that more particularly in those horses which either naturally or by education 'set themselves much on their haunches:' for in such, an extra portion of weight is added, and extra exertion is required of it. In the mode of riding usually practised in England, the weight is more thrown on the shoulders and fore limbs; and, consequently, in English horses these are the parts that generally first fail; but in France, and the whole of what is called the Continent, where the arts of the manege are still in some repute, this joint is more liable to suffer, and, consequently, spavins are or were equally plenty there as splents are with us.

The posterior Metatarsals, Coronary, and Coffin Bones.

These bones have so much general resemblance to those of the fore extremities, that I shall only point out the particular variations which occur in them. The *large metatarsal bone*, or cannon, is longer, and altogether larger than that of the anterior extremity; it is articulated above with the intermediate cuneiform; in part with the lesser cuneiform and cuboid; and below with the pastern and sessamoids. The *external small metatarsal* is considerably larger than the internal, articulating superiorly with the cuboid, and laterally with the cannon. The *internal* is somewhat less; it articulates above with the little cuneiform, and laterally with the internal edge of the cannon: in most other respects these bones resemble the anterior metacarpals. The *great pastern* bone is longer than the anterior, and its situation is less oblique, which constitute its principal differences. The *sessamoids* are two, and do not differ from those already described. The *coronary*

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* The mere inspection of the hock would be sufficient to bespeak its importance to the progression of every quadruped; but in the horse its mechanism is at once complex and powerful in the extreme, and at the same time is so elastic as to possess a remarkable capability of rapid and long-continued motion. By its extent of surface it affords sufficient attachment for the tendons and muscles which operate in progression, nor is its framing less worthy of admiration in affording so much ease and elasticity during the most concussive motions of the animal; for the weight carried downward by the tibia is here received, not by one opposed bone only, and that in a right line with itself; but, being itself oblique, it transmits its impulse not to one bone alone, but the effort is communicated and dispersed through seven, whose impulses thus directed, without concurrent jar, are again given to the great metatarsal bones, and by them continued downwards. Thus, in the ox and sheep, whose motions are less agile, instead of six bones there are but four; and a peculiarly formed and perfect hock seems essential to those animals who are intended not only to gallop but to perform all their cadences with perfectiôn. Not only does the hock receive the superincumbent weight, but it is calculated to extend the general motive powers by the extension of the process of the os calcis, into the point of which very powerful tendons implant themselves, and thereby act with all the advantage of a lever; nor will it be difficult, under this view, to perceive that the increased or diminished length of this process, or, in other words, that broad or narrow hocks are favourable or unfavourable to progression, as they possess the one or the other form.

bone being less oblique in its position, and resting more on the coffin, and less on the navicular bones here than in the anterior limb, slightly alters its articulatory surfaces; in the coffin bone also the fossa of articulation is deeper; the reason of which appears to be, that, as a horse has frequently to support his whole weight on his hinder extremities, so it was necessary that these bones should be opposed to each other in a more direct line, whereby they acquire strength; the loss of elasticity thus occasioned is, however, amply made up by the formation of the hock: and as, in action, the natural inclination of the posterior extremities must carry them much under the animal to gain the common centre of gravity; so, had these articulations allowed of equal obliquity with those before, the navicular bone would have been too much pressed upon; add to which, that, in throwing a horse on his haunches, his fetlocks would have been actually brought to the ground; but in the present formation the bony pillar takes off much of that strain which would otherwise have been forced upon the tendons.

Of the Skeleton, considered mechanically.

It is evident that the progression of animals depends principally on the form and direction of the parts constituting the base of the machine; and we shall find that the mechanical structure of the skeleton is admirably adapted for giving ease and celerity to motion. The horse presents a quadrilateral figure, of four supporting pillars to an inclined cylinder[*], which is not placed in equal lengths upon these supports, but has the head and neck projected forwards: which is again counterpoised by the additional weight in the hinder parts, so as to leave the line of direction still near the centre of the whole. The length of a cylinder may be such as not to support its own weight; Nature has, therefore, wisely limited the length of the spine in animals, and their general growth: hence, *cæteris paribus*, a short-backed horse must be stronger than a long one; it is likewise upon this mechanical principle that smaller animals can carry proportionably more than larger. In the osseous pillars forming the legs, scarcely any of the bones are perpendicularly opposed to each other; yet it will be found in the well-formed animal that a perpendicular from their common centre of gravity falls nearly within their common base: by which means they are supported as firmly as though their individual axes had been in a line perpendicular to the horizon. It likewise greatly increases our admiration of this mechanism when we observe the contra-disposition of the angles between the fore and hinder pillars or legs. Had these angles existed in the same direction, the body must have been precipitated forward or backward; but each angle opposing a counteraction to the other, the machine is firmly sustained between them. The fore and hind limbs are evidently intended as opponents to each other; they present, independent of their inclinations, altogether a different character. Less angular, the fore appear more in the true character of pillars, and purposely formed to receive the weight impelled on them by the hinder limbs. This weight they sustain until their elevation is forced upon them by the central tendency of the whole, and the impulsive force from behind. The hinder extremities, at no time bearing an increase of pressure as the fore do, from the impetus communicated from behind, are much more angular, and, by being thrown into a backward direction, afford the necessary means for propelling the body forwards. The angular construction of the limbs it must be evident is greatly favourable to their elasticity also: had they been perpendicularly opposed to each other, there could have been but little ease or quickness in motion; every exertion would have been a jar, and every increased effort would produce luxation or fracture. This deviation from an upright position in the bones must necessarily, however, require great powers to sustain them, which is done by muscles; and wherever the angles are found greatest, the muscles will be found strongest. This muscular exertion to counterbalance the angular inclination occasions fatigue, which is the reason why one posture continued for a length of time gives a sense of pain: the set of muscles immediately engaged becoming weary, the animal is obliged to call another into play; and which change will be necessarily more or less frequent, as the animal is weaker or stronger. The *extent*, therefore, of the action of parts is the produce of their length, their direction, and the different angles they are capable of forming; the *force* arises from the direction, in combination with the agency of the muscles. The *repetition* of the action is dependent on the muscles alone; but as the original action arose out of the length and direction of the parts, so it will be evident that, in every subsequent repetition, it will be more or less extensive as these are more or less perfect in their formation, even though the muscular exertions should be the same; hence some strong animals cannot move so fast as weaker ones of the same kind, as the cart horse and racer, or the greyhound and mastiff. The power of muscles is increased or diminished as they are situated near or more distant from the centre of motion: thus, the bones are usually so placed as to give the muscles this advantageous position. To furnish this advantage some bones are formed into angles, as the femur and tibia; others throw out processes, such as the olecranon, calcaneum, &c. Every change in the position of a body must occasion a similar one in the centre of gravity: in order to preserve which, the direction of the limbs is changed to form a new centre for the moving machine in the act of progression.

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[*] The human is a perpendicular body, supported by two pillars; the spine of which appears as two pyramids joined into one common base; and though nowhere straight, is so ingeniously contrived, that a perpendicular from their common centre of gravity falls into their common base. The human, therefore, by this alteration in position, becomes a much more complex machine than the brute.

SECT. IX.

SYNDESMOLOGY

COMPREHENDS all the appendages to bone, as the *cartilages*, *periosteum*, *medulla*, *ligaments*, and *synovia*.

Cartilages may be divided into three kinds; *articular*, *non-articular*, and *temporary*. Considered generally, cartilage (familiarly called *gristle*) is a smooth, minutely fibrous, white, uniform, elastic substance, harder than most other parts, but less so than bone; having little vascularity, and being furnished with a membrane reflected over it, called *perichondrium*.

Articular or *obducent cartilages* furnish the extremity of every articulated bone, in the form of a layer or tip, which is thickest at the point of extreme pressure. By these means, the bones slide easily on one another, and the elasticity of the interposed cartilage prevents the effects of that concussion which must otherwise take place between two such inelastic bodies as bones.

The *non-articular cartilages* are divided into the attached and unattached. *Attached* cartilages are such as are placed on the ends of bones not articulated, as the spine of the ilium, sides of the foot, ends of the sternum, supercilia of cavities, &c. They are likewise interposed between bones immoveably joined, as the symphysis pubis, &c. The cartilages of the ribs are of this kind, and afford flexibility to parts that would otherwise have but little. The septum narium is an attached non-articular cartilage, serving the purpose of bone. The *unattached cartilages* serve to sustain parts without adhering to any bone; those of the ears and larynx are familiar instances. A variety exists, which may be named *cartilago-ligamentous*, from its partaking of the properties of both cartilage and ligament; such are those between the bodies of the vertebræ, &c. Bones attached to each other by cartilaginous union, as the splent bones, the ulnæ, and fibulæ, are fortified from all dislocation, yet enjoy the advantages of a limited joint, and possess sufficient motion to form a spring, and to resist the effects of concussion. The *temporary cartilages* are those of which the ends of bones are formed in young animals; they are very vascular, that they may be the more easily absorbed, and bone formed in their room as the organs become fully ossified. The description of individual cartilages will appear in the progress of the work, therefore I shall not particularize them here. The powers of life in cartilages, though small, yet are fully evinced by their liability to ossification, and which disposition appears more common and universal in those of the horse than of any other known animal; there being very few cartilaginous parts in him that have not been found partially converted into bone by age, or the stimulus of great exertion, &c.; from which we readily perceive why stiffness and want of elasticity are the consequences of these states, the elasticity of the cartilages decreasing with the progress of ossification. The ulceration of cartilage, from its slight vascularity, is necessarily very slow, as we witness in its attack on the nasal septum, and on the lateral cartilages in quittor: but from some connexion with the vascular parts around, ulceration proceeds much quicker at the ends of bones, where an opening into the joint has been made. It is not ascertained that true cartilage is ever reproduced; but a cartilago-ligamentous substance is substituted sometimes by healthy granulations.

The *periosteum* is a general investing membrane to bones and their appendages, receiving different names as it covers different parts; that investing the skull being called *pericranium;* that stretched over cartilages, *perichondrium;* and when it covers ligaments, *peridesmium.* The uses of the periosteum appear to be to circumscribe the form of bones, and to protect them by its tenseness: it is also the medium whereby they are furnished with their vessels. Periosteum, in a healthy state, has but little sensation; but, like some other parts, when diseased it becomes very sensible.

The *medulla* or *marrow* is a soft, fatty matter, deposited in the cancelli of bones, particularly of the long ones, by means of little membranous sacs, which do not communicate, or the marrow would gravitate; and which, as keeping the unctuous matter distinct from the bones, convinces us that the use of this oil is not that of preventing brittleness in them. The medullary vessels secrete the marrow within these cells; and which secretion, being in itself wholly inorganic, confutes the foolish notion of the exquisite sensibility of the marrow.

Ligaments are dense, white, fibrous substances, of great tenacity; either cord-like as tendons, or expanded into more plane layers. Under still greater tenuity, ligament becomes a common membrane in every part of the body; but it is more particularly appropriate to bones, and hence is generally described with them. Ligaments are usually inelastic; there are however exceptions, as the great cervical ligament of the neck, and the suspensory ligament of the extremities. Some of them partake of the nature of cartilage, and are hence called cartilaginous ligaments, being hard and little vascular. These organs may be divided into connecting, suspensory, and capsular. *Connecting ligaments* are variable in form, strength, and situation, and are usually found stretched from one part to another. Thecas, aponeuroses, and facias, are modifications of connecting tendinous ligaments. *Suspensory ligaments* sustain parts, as the flat one springing from the head of the femur suspends it within the acetabulum. The ligaments of the liver attach it also in its situation; and those which connect the sessamoid bones to the fetlock joint are likewise of this kind.

Capsular ligaments surround the ends of articulated bones, and form the joint into a complete cavity, which appears a principal end in their formation; for they are frequently of considerable length, often of no great thickness, but are always impervious. By the density of their structure, and by their inelasticity, they must, however, add to the strength of the joint, and assist in preventing dislocation. Capsular ligaments are not very sensible without, but they are extremely sensible and vascular within; and secrete from their inner surface a mucus called synovia. It is from the sensibility of this inner surface that the inflammation produced on wounds into the cavity of a joint is so extreme. After the escape of the synovia, the whole surface of the joint, which is very large when expanded, receives the stimulus of the external air, suffers attrition, and becomes irritated and inflamed to the highest degree. (See *Wounds in Joints.*) The individual ligaments will be described with the parts they belong to.

The *synovia* is a fluid popularly, but erroneously, termed *joint-oil*, for it is simply mucilaginous, and not unlike the white of an egg, and appears to be secreted by the vessels of the capsular ligaments. Its lubricating use is very great; for without it, the attrition between the articulated ends of bones would painfully interfere with motion: but by this slippery medium they readily slide over each other, without pain or difficulty. This fluid may be secreted in undue quantities, and then forms capsular dropsy, which is not, however, frequent in the horse. Bursal dropsy, under the name of windgall, is sufficiently common.

SECT. X.

MYOLOGY.

MUSCLE is that part in an animal we term flesh, in distinction from skin, cartilage, bone, membrane, &c.; and the phenomena it exhibits are so universal, that it is probable it exists in every animal, though we are not so easily able to detect it in some as in others. Muscles appear composed of reddish bundles of fibres laid alongside of each other, divisible into lesser fibrillæ of the same figure, the ultimate division of which it is impossible to trace*. When a mass of these bundles is connected together into a determinate form, it is then called a muscle: and as the motions of an animal are very various, and the circumstances under which they are brought about equally so, the peculiar shape these motive masses take on is as varied†. Muscular fibre not only exists in determinate masses, but it appears to be spread over almost the whole of the body also; and it has been very judiciously remarked that our ideas of it are probably much too limited‡: thus, it constitutes a principal part of all the viscera, and enters into the composition, it is probable, of many membranes; and, in fact, forms the bulk of the body in most animals. What is, however, generally understood by a muscle, is a distinct body, having its determinate parts. The vascularity of muscles is extreme; in the red-blooded, their intense colour is wholly derived from the quantity of blood within them: but, from the circumstance that many muscular parts are colourless, red blood does not seem essentially necessary to muscular phenomena: their ultimate power, however, is connected with blood in general; for when deprived of a part of it, they become weak; and if it be wholly lost, they will wither and die. On the contrary, by exertion, which is but another term for increasing their vascularity by forcing more blood into them, they enlarge in size, in strength, and colour. (See *Nature and Properties of the Blood.*) The *condition* of a racer or hunter is that admired tension and swelling of the muscles gained by exercise, under the name of 'training,' contrasted with the general rotundity of frame arising from interstitial matter. From the extreme vascularity of muscles, their living powers are very great; they are also plentifully supplied with nerves and absorbents. Superadded to the general living powers of other parts, they own one peculiar to themselves, whereby they contract and shorten at pleasure; during which contraction, they become thicker and harder, but without actual increase to their bulk. This power is dependent on the will in the *voluntary* muscles, and in the *involuntary* on appropriate stimuli, as blood stimulates the heart, and light the iris. This obedience to the action of stimuli has been called their *irritability*, and exists after death; it likewise remains in them on their removal from the body, whence it must be an inherent property*. If, however, the nerves going to voluntary muscles are tied, we lose our power over them; they become paralytic, and incapable of obeying the commands of the will: hence it would appear, that nervous influence is the proper stimulus to voluntary muscles. Neither can the will force the muscles to contract beyond the capacity of their physical powers; and hence, after exertion, they become fatigued, and at last paralytic†.

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* The muscular fasciculi are not of uniform size; in some muscles they are larger and coarser than in others: they are particularly so in the masses of the glutei. In some specimens in the same families the muscular texture is universally coarser; as we see in the grain of some beef and mutton. Bull-beef is as obnoxious for this as for the rankness arising from spermatic diffusion. The *direction* of the fibres is not always the same, which has given rise to the division of muscles into rectilinear or straight, radiated or in rays, compound or intersecting each other, and penniform when the fibres branch out in an angular direction like the plumes of a pen. In most muscles there may be observed two kinds of fibres; the one red and purely muscular; the other of a firmer texture, white and glistening: the former are sensible and elastic, the latter insensible and inelastic.

† Muscles, from their infinite variety, are named according to their form, as triangularis, trapezius, &c.; or after their course, situation, and attachments, as recti, subscapularis, sterno brachialis, &c.: or from their uses, as flexors, extensors, abductors, adductors, &c. &c. Each is again divided into its origin or head; its body or belly; and its insertion: but this admits of latitude, as these parts change by the action of the muscle itself under various circumstances.

‡ We must not conclude those parts only as muscular that are of a red colour; for the muscles of insects, of fishes, and of many fowls, are white. The iris, the stomach, the bladder, and the intestines, whose contractions are powerful and distinctly muscular, want the characteristic hue of red flesh. The hydatid is a transparent bag; yet, when put into warm water, produces motion and contraction, and must therefore be supposed to be muscular.

Muscles are called voluntary and involuntary. *Voluntary muscles* are such as are immediately under the influence of the will, as those of the arms, legs, eyes, mouth, &c. *Involuntary muscles* are such as are not under our guidance, and whose functions go on without control, as the heart, the respiratory and digestive muscles. A third sort may be added, which partakes of the nature of both, and are thence called *mixed:* such are the respiratory muscles, whose action we can increase or diminish, but cannot wholly suspend. Muscles acquire a power of acting dependent on their situation and their points of attachment; and as these points can be altered by the muscle itself, their actions become much diversified, some more so than others. Voluntary muscles have usually antagonists, whereby the perpetual tendency to contraction is counterbalanced. The muscular masses are commonly invested by a cellular or membranous covering, which in some instances is very dense, called *fascia,* whereby they are bound down and assisted in their action.

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* It is to these contradictory facts, that our total ignorance of the phenomena of muscular contraction is principally owing; for as the muscles can contract, not only after what we understand by death, but also when cut off from all communication with the brain and nerves, so it might be concluded that their contractile powers were independent of them. But other phenomena convince that such is not the case: the brain and nerves are not only the medium through which we operate on the voluntary muscles, but they have a paramount influence on the voluntary and involuntary also; as we see in tetanus, epilepsy, &c., which we are assured, from incontrovertible facts, are irritations on the sensorium, or its adjuncts the nerves. The exertions of a phrenitic horse and of a maniacal man are infinitely greater than either are capable of under mere healthy excitement; because the muscles receive a more than ordinary portion of sensorial or nervous influence. This will also explain why horses when vicious, or when running away through fear, exhibit such uncontrollable efforts.

† It is by this influence over the contraction of the muscles by nervous excitement that various other phenomena also can be readily explained. It is thus we learn why the relative forces of large and small muscles are not in the ratio of their bulk; for some small muscles are much stronger than larger ones, and some small animals than others of greater magnitude. The locomotive exertions of the blood-horse are, comparatively with his bulk, much greater than those of the cart-horse, because the nervous excitement of the one is greater than the other.

Tendons.—To the generality of muscles, particularly to those ending in bones, is added another part of a very different texture, appearing first as an insensible, inelastic, fibrous substance, of extreme tenacity, intermixed with the fleshy fibres, but which become finally aggregated into a cord called a *tendon.* The forms of tendons differ; and they are seen round, flat, extended, &c.: when their extension is thin and considerable, it is called an *aponeurosis:* with still greater extension and tenuity, it becomes *fascia.* The size of the tendons is not always proportionate to that of the muscles they belong to, and some muscles are altogether without any determinate tendinous cord; but probably no muscle is unmixed with tendinous fibre. Tendons are but little vascular, nor can we easily detect any nerves in them; their powers of life are consequently small, and from being so little vascular, they are hardly putrefactive: nor are they at all sensible but under inflammation; when they, in common with some other insensible parts, as the periosteum, become highly so, either by themselves, or probably by their granulations*. The thecal membrane also which covers them is under inflammation singularly sensible, which will account for the extreme pain and tenderness consequent on sprains. The absorbing system of tendons appears likewise inconsiderable, which paucity of vital powers renders their ulcerative and reproductive processes necessarily slow†; nevertheless, both in the ass and dog, a divided tendon has reunited; and the tendon Achilles in man also. The uses of the tendons are very important; they combine immense strength with diminished bulk: hence are peculiarly appropriate to the muscles of the extremities, where symmetry of parts and freedom of motion are required. What could have been expected from the limbs of the racer, light, elegant, and flexible as we now see them, had the muscles been continued downwards of the self same bulk as we see them at their origin in the arm before, or in the buttock behind? Tendons have a general covering from the cellular membrane; and an individual *theca,* or sheath, is appropriated to many others, by which they are prevented from displacement during action. At the extremity of most tendons, inserted into moveable parts, or between them and their thecal appendages or sheaths, and sometimes at the points of contact between two of them moving on each other, there is found a *bursa mucosa,* or tendinous capsule, containing a lubricating mucus, of the nature of synovia. (See *Bursalogy.*)

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* When the extensor tendon has been exposed in broken knees, if it be pricked or irritated, the animal immediately evinces much pain.

† Mr. Percivall has a very excellent practical remark on the tedious process of ulceration in tendons: 'So that if matter be poured forth under a tendinous fascia, unless we discover its presence in time, and give it free issue by puncture, it will burrow among the muscles or other soft parts, and produce extensive mischief; whereas, had it been collected under the skin, ulceration of the integument would have readily discharged it, without any surgical assistance.'—*Lectures,* p. 201.

Of Individual Muscles.

Æquine anatomy, like a young child, has been forced to draw all its supplies from the parent stock (human anatomy): and it is more than probable that the connexion can never be entirely dissolved. But the *prone situation* of the brute, the progressional uses he makes of his fore extremities, and the extreme extension of his head and neck, must create much diversity in the arrangement of his muscles from those of the parent; and hence has arisen difficulty and confusion in forming an appropriate nomenclature. This was felt as early as the time of Ruini, who classed the muscles of the horse numerically. Bourgelat, the father of veterinary anatomy, stooped also to this feeble aid, where the analogy between the human and brute subjects failed him; where they did not, he pursued the human myological nomenclature: as did the other eminent French anatomists of the horse frame, as La Fosse, Vitet, &c.

Such of our English authors as have at all attempted to display æquine myology, from Snape to the present time, have one and all followed the human type. Stubbs, our greatest authority on this head, was wholly guided by it. From this track some divergence was first made by Chaussier, whose method has been adopted by M. Girard, the most eminent among veterinary anatomists; and though not altogether free from serious objections, it certainly offers a new and more critical view of the subject, environed with many difficulties. Mr. Percivall, whose myology is drawn from this source, but enlarged in a masterly manner, presents us with two nomenclatures, one of which is a translation of Girard into Latin, the conventional language of science; the other is dressed in the nomenclature of human myology. With regard to the necessity of a minute attention to *all* the muscles of the body, it may be said, that an acquaintance with every part is useful; but it may be allowed, that *this* is not absolutely necessary to every veterinarian. The means of acquiring a due knowledge of all of them is, however, within the reach of such as wish it. Stubbs is yet before the public, and is still more readily accessible through *Boardman's Veterinary Dictionary; Girard's Traité d'Anatomie Vétérinaire* may be obtained; or Mr. Percivall may be studied in his *Lectures*, or in *The Veterinarian.* A particular description of each muscle will, therefore, in this edition of the OUTLINES, give place to more important matter in the practical part of the work.

But it must not thence be supposed that this branch of æquine anatomy has been passed over in silence; on the contrary, every important muscle will be noticed with the general anatomical examination of the several organs. In the myology of the extremities, as subjects of peculiar interest, I have endeavoured to be particularly correct. The figures illustrating them were the result of numerous dissections made by myself, with great care; and the drawings were taken also by myself from the dissections, which enables me to vouch for their accuracy: compared with the subject, as it appears under dissection, they will, I am persuaded, mainly agree; but with the descriptions given by different authors they may not altogether correspond; for I have never yet found any two *original* writers who did entirely coincide with each other. Different views are taken of origins, attachments, insertions, and divisions: parts are by some taken for a whole; the ligaments of one are the tendons of another, &c. &c. &c. With these discrepancies before me, I studied the page of Nature, and endeavoured to represent her as she is: she may have been, and without doubt has been, better dressed; but my object was to represent her as she is; so that when she may become deranged by disease, the practitioner may better know what is the nature of the change, and to what he is to restore her by his *ars medendi.* As regards the nomination of the muscles, I think so much is due to our alma mater, the Veterinary College, as the source from whence our orthodox vocabulary should emanate, that, were I in possession of that in which the college anatomical lectures are given, I should certainly make all my future descriptions agree with it. The nomenclatures of different writers vary; that of Girard is popular in France, but that of Mr. Percivall is better suited to English ears, as well as being in many instances more strictly appropriate, and certainly, as a whole, more inductive to English students.

SECT. XI.

BURSALOGY.

THIS subject comprises a knowledge of those appendages to tendons whereby the effects of friction are prevented. Tendons are usually furnished with a sheath or theca, within which is secreted a glairy, slippery mucus, of a similar nature with synovia, by which they are enabled to slide within these sheaths with great ease. At the extremities of the tendons, and also between them and other parts, and between contiguous tendons themselves, wherever they are liable to pressure or friction, these slippery mediums are frequent: these form distinct membranous sacs not unlike the capsular ligaments, and are called *mucous capsules* or *bursæ mucosæ*, being formed of a dense cellular membrane, whose internal vascular surface secretes this mucus. From external injury, or other causes, this surface becomes at times inflamed; and, when resolution of such inflammation is not effected speedily, coagulable lymph is thrown out, which being not always again absorbed, remains between the tendons and its sheath, and occasions distention and lameness, from the obstruction it offers to the freedom of motion; therefore, we are at no loss to account for the gorged sinews in hard-worked horses, nor for the *stiffness* they occasion. The mucous capsules at the extremities of the tendons also are extremely liable to become distended; and bursal disease receives very different names according to its situation, as *windgalls* at the fetlock, *bog spavin* or *thoroughpin* in the hock, and *capulet* at the hock point: occasionally bursal enlargements are seen in the knee also. These diseased accumulations appear to be brought on by undue exertion of the parts continued beyond the natural powers of renovation: after which exertion appears to act as a stimulus to them both to increase and to disease the mucous secretion within. (See *Windgalls*, &c.) For a more detailed account of the individual *bursæ mucosæ*, I would refer the student to Girard and Percivall; to Monro's description of them, with plates likewise; and to Fourcroy's *Mémoire des Tendons;* for wherever the muscles of the human and horse bear a parallel, there, it may be readily imagined, those of the tendons and mucous capsules have likewise the same.

SECT. XII.

ANGIOLOGY.

THE *vessels* of the body are divided into *arteries*, *veins*, and *absorbents;* and, except the hoofs and epidermis, there is perhaps no part of the body without them.

Of the Arteries generally.

The *arteries* are canals originating from the ventricles of the heart by two trunks, the aorta and pulmonary, whose subdivisions are destined to supply the whole body with blood. Considered generally, arteries are long membranous tubes, which by reason of their numerous bifurcations become smaller as they proceed to the extreme parts*. In their course an especial regard is observed towards their safety; hence they are deep seated, and pass on the inner sides of the limbs rather than on the outer. They appear equally guarded against accidental pressure from neighbouring parts, by passing over the bending surface of a joint; and where the extension of soft parts and their frequent motions would render the blood within con-

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* Although the individual vessels themselves diminish, yet the conjoined area of the numerous subdivisions springing from them is greater than the parent trunks; which increase appears to arise from the greater capacity of the subdivisions, and the proportional increase to their coats.

tinually liable to obstruction, they proceed in a tortuous course*. An artery is composed of three different substances or tunics, united by means of cellular membrane into one elastic tube: the *external* coat appears a thick, dense, membranous coat of peculiar whiteness†, whose *elastic* powers are so considerable, as to preserve the cylindrical form of the principal canals when empty. By their elastic power the arteries are capable of being distended so as to admit of a larger quantity of fluid than is merely sufficient to render them cylindrical: by this likewise they can adapt themselves to a smaller quantity than is usual; and were it not for this property, a small hæmorrhage only must prove fatal. It is by this elasticity, which operates longitudinally as well as circularly, that the divided ends of a wounded artery retreat within the cellular substance around, and thus close its divided orifices. When this contraction is prevented by a partial division only, the hæmorrhage continues‡. The elastic powers appear in dissimilar proportions in different horses, as in different men; from which arises some constitutional phenomena in the individuals of each species, giving some a greater disposition to inflammation, which is called a sanguineous temperament. The *muscular* coat of the arteries is interposed between the two others, and appears formed of fibres nearly circular, extending around the artery by several segmental portions joined together; which fibres are stronger in the small than in the large branches, and strongest of all in the capillaries. The muscular tunic appears to exist in greater proportion in the horse than in the human, and this accounts for the predisposition in him to violent inflammation; and it is from hence that in him adhesive inflammation is less common, but the process of ulceration peculiarly quick, and that granulations so speedily form. To this cause it is probably owing, also, that acute inflammations of the vital organs in the horse run through their stages so much quicker than similar affections in the human. Inflammation of the lungs frequently terminates fatally in forty-eight and sometimes in thirty-six hours. From this power also it is, that a horse can bear the division of a much larger artery without danger than a man. From the strength of this muscular coat in the capillary arteries, in the monitory symptoms of fever, the blood is either forced back into the larger vessels, or pressed forwards into the veins, by which shivering and a sensation of coldness is produced in these cases§. The *internal* coat, like the exterior, is also membranous, but much thinner; more dense, but less elastic than the outer: the smooth surface it presents is admirably calculated to allow a free passage to the course of the blood.

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* The tortuous direction of the arteries serves also some other purpose than that of preserving them from accidental obstruction by pressure: this we learn from finding them so in the brain, testicle, and uterus, where they can be little liable to it. Here, retarding the flow of the blood is probably studied for some functional purpose.

† The whiteness of the arteries is of considerable importance both to the anatomical dissector and the practical surgeon, as by its means the presence of an arterial trunk is at once detected.

‡ Aware of this circumstance, a prudent surgeon immediately severs the half-divided vessel; and if it be not a large one, this alone is sufficient to stop the flow of blood.

§ A muscular coat has, however, been denied, from the uniform whiteness of the arteries; but we have had other occasions of pointing out, that want of colour is no proof of the absence of muscular structure. Mr. Hunter having bled a horse to death, found that the area of these vessels was considerably diminished; the aorta had lost one-twentieth of its original breadth, while the radial artery was contracted to one-half. Other proofs establish the muscularity of these vessels: a principal one is the fact of their acting without acceleration or alteration of the pulsations of the heart, as we know from slight topical inflammations, and from a blush on the cheek, all which excite heat and redness in the part, but do not disturb the general circulation.—Vide *Hunter's Lectures; Wilson on the Blood;* and *Dr. Thompson on Inflammation.*

Our knowledge of the termination of these vessels is very confined; we can readily see their ordinary termination by anastomosis, or the uniting of one branch into another, whereby the blood has its course in some measure altered, and the constitution receives safety under the division of the vessels of a part, from its being thus furnished by some other. Our practice of surgery is greatly extended by this knowledge, and we no longer fear taking up a large artery*: by this free communication, pressure, likewise, is less injurious than it would otherwise be. We also know that arteries terminate by means of their capillary branches in veins, because we can empty the arteries, by drawing the blood from the venal trunks; and because injection forced into the arteries, in many instances enters the veins. They likewise terminate by excretory ducts on secreting surfaces, or within bodies called glands; by which the arterial contents become in themselves changed; and, part of the blood having remained to enter into new combinations, the remainder is returned by venal branches. Arteries have also another common termination, by exhalent openings on extended surfaces: it is by this means the insensible perspiration passes off; and by the same means serous fluids are emitted throughout most membranous surfaces and cavities. A more confined termination of arteries is that into cells, from which veins arise to take it up again, as in the spleen, &c. Different parts are more or less plentifully supplied with arteries according to their nature: secreting organs have usually large trunks, as the kidneys, spleen, liver, &c.; they are likewise themselves furnished with arterial and venal branches, for the nourishment of their tubes. They have also nerves furnished to them from the ganglial or sympathetic trunks; but they are nearly destitute of feeling†: their absorbents are too minute to be detected, but analogy would make us conclude they were not without them.

The living power of the arteries must be great, for they are capable of extending themselves through coagulable lymph thrown out previously: this we see take place in the callus of bones, and in cicatrices, which in time become vascular; but an artery, when divided, will not become pervious, although a vein will. The evident use of the arteries is to convey the blood from the heart to the different parts of the body; thus keeping up the vital principle in these parts, by being the bearers of nutriment and heat. An intimate knowledge of their functions, therefore, forms a very principal branch of physiology; as a well-grounded acquaintance with their situation is likewise essentially necessary to the veterinary surgeon.

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* The horse suffers nothing from the loss of a carotid, and the dog has had an iliac artery taken up without sensible injury; so extensive is the communication by anastomosis.

† This distribution of nervous energy to the aortic system, according to the present prevailing theories, offers matter for consideration very interesting to the veterinarian, as it embraces a much wider field than the mere support of the arterial tube itself. It appears that, although the sensibility of the arterial trunks is usually considered to be small, yet that they are very ready to be acted upon in their functional capacity by nervous agency; thus, when the nerves communicate too much energy to these vessels, and inordinately increase their vigour, inflammation follows. If this inordinate supply springs at once from the source, and extends through the whole arterial system, fever is the consequence; but when it is confined to a small space, or to a single organ, then it is the parent of local inflammation. This view of the connexion between the nervous and sanguiferous systems is thought to offer the best theory of inflammation, and best to agree with its various phenomena. In my own opinion, this theory gains much support from the phenomena observed in muscular contraction generally, which we know to be wonderfully influenced by nervous energy.—See *Myology*.

Mr. Hunter has taught, that there is a strong affinity or peculiar connexion between the blood and its vessels; and his opinions on this subject have led to considerable alterations in our manner of treating diseases in general, and wounds in particular. The fluid state of the blood appears connected with living vessels; blood parted from them dies and coagulates. The blood likewise stimulates its vessels, which, perhaps, is one very principal cause of their contraction: but this stimulus should have limits. When inordinately increased, disease is produced: neither is it unlikely that a defect in this natural stimulus may also produce derangement. *(See the last note.)* As the use of the arteries is to convey the blood from the heart, so the heart itself appears to be the first but not the only agent. The arteries equally unite in the office; and as the force of the heart decreases by distance, that of the arteries strengthens the farther they are removed from it; so that, at last, the column is pressed on to almost a continuous stream: thus when a very small artery is divided, there is a regular flow, with scarcely any jet: this, however, only takes place in their minutest branches. We thus see why there is no pulsation in the veins; they receive the blood from the arteries in one equable stream, and continue it by the last impulsive force of the heart, and the new one of the arteries. Pulsation is a certain sensation in the artery; which, from various experiments, is found to arise from its being alternately in a state of distention and relaxation. It appears that, when the left ventricle contracts, and forces the blood into the arteries, the pressure of the fluid occasions a distention and dilatation of their coats, which is termed their *diastole:* when the left ventricle ceases to act, and becomes distended, the impetus against the sides of the vessels ceases, and now the muscular fibres of the artery contract and lessen its size, producing its *relaxation* or *systole*.

Of the Pulse.

This momentary increase of capacity in the artery, whereby its diameter is enlarged, is called its *pulse;* and the more or less frequent are these dilatations in it, so is the pulse quicker or slower. The circulation of the blood in animals being usually (as regards its momentum) in the ratio of their bulk, i. e. that it is tardy in the large, and quick in the small*, has given to every kind *a standard pulse.* In the adult horse it may be stated to range between 36 and 46†: in the colt it will be found at birth upwards of 60;

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* This ratio of circulation is dependent on the principle, that a large animal having a greater distance to propel the vital fluid from its fountain, the resistance to be overcome is greater, and it must therefore, of necessity, require a longer time to accomplish its exit and return. Thus it will be found, that between the large draught horse and the diminutive pony the mean pulsations will vary 6 or 8 per minute, which circumstance should not be lost sight of by the medical practitioner when examining horses of such disproportionate sizes.

† In consequence of the statements of Vatel and Girard, that the standard pulsations of the ordinary horse average 35 per minute, whereas Mr. Percivall states them at 45, and myself at something more, I have however, since this was written, made innumerable examinations of horses of every size, and under every variety of circumstance; and the result has been, that I am convinced that the average is really lower than that of either Mr. P. or of that which I have heretofore stated it; but that it is not so low as 32, which is that of Vatel and Mr. Sewell. I believe the error of both Mr. P. and myself has been occasioned by the same circumstance, which is, that most of our examinations have been made on horses within the confines of a stable, probably on those of a medium size also; as well as usually on such as were under the stimulating effects of liberal feeding, and fre-

but it decreases in frequency, at first rapidly and afterwards more slowly, to the adult standard. This variation between the young and adult pulse is, however, less dependent on their relative sizes than on weakness of the system, and the consequent irritability at this early period.

There are also other causes of individual variation in the pulse of horses of the same size. The idiosyncrasies, or constitutional peculiarities of some, occasion a departure from the usual standard pulse attributable to that size: in the irritable and impatient horse it is commonly 5 or 6 more per minute than in the mild and temperate: and in some blood horses this is peculiarly the case. A low bred sluggish horse is commonly below the standard of his size in his pulsations. In stabled horses the pulsations are always more frequent than in those abroad; and it is accelerated in the degree corresponding with the heat of their dwelling, the nature of their clothing, and the stimulating property of their food. Desire, impatience, and fear, all raise the pulse: as regards the latter, it particularly concerns the medical attendant that his examination of his patient be so conducted as not to alarm; which, in some, is very easily done on the approach of a stranger. Without this precaution, the pulse may present a very wrong indication: an equal attention to all the foregoing causes of deviations is also necessary, where a critical examination of the pulse is to be made.

Viewed medically, the *pulse* is important, as it affords us our best criterion of the state of the sanguiferous system, which may become in itself the *immediate* seat of disturbance; or otherwise *mediately* so, from active disease present in any of the important vital organs, or, in other words, the pulse may be influenced, indirectly, by the general state of the body, but directly by that of the heart, or of the arteries, or of both, or of the quantity of blood which the vessels have to contain. The pulse affords us a ready indication of a quickened or a tardy state of the circulation; but were our information to stop here, it would be limited indeed; and the pulse would then prove but an indifferent nosometer. By an accelerated pulse we might certainly presuppose irritability and excitement; and by one retarded below its natural standard, we might as readily conjecture a state of congestion, or a deficiency of nervous energy. But the first will often accompany external and momentary causes; and the last may, to a certain degree, be brought on by drowsiness after a hearty meal. Here, then, both the quick and the slow pulse might accompany a healthy state, and fail to prove true criteria of disease. There are, therefore, various other conditions of the pulse besides its number to which we should attend: these may be characterized, to a certain degree, and to a certain degree only, by the familiar terms of strong, hard, soft, wiry, oppressed, small, quick, frequent, slow, regular, and irregular*;

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quently of clothing too. Vatel states the pulse of the horse as 32 to 38 beats per minute; of the ass, 48 to 54; of the ox and cow, 35 to 42; of the sheep, 70 to 79; of the goat, 72 to 76; of the dog, 90 to 100; of the cat, 110 to 120. Hurtrel D'Arboval gives them as 35 in the horse; 50 in the ass; 38 in the cow; 65 in the sheep; and as 80 to 100 in the dog.

* I would not willingly alarm the tyro by this catalogue of varieties in the pulse; for although they all do exist, it is not absolutely essential, in the greater number of instances, that he be at once intimate with the whole of them. The cases which will occur in the course of his profession will bring them before him, provided he is watchful to profit by them. On his outset, it will be sufficient that he attend to the following states, which, with the opinions concerning their original importance, we will give in the words of an apparently acute writer, in No. 29 of *The Veterinarian*. 'So many different appellations have been given to different kinds of pulses, that it tends more to confuse than assist *us*' (query the young practitioner); 'but by attending to the four following rules, we shall find them, I think, *quite sufficient*; and, at all events, others may easily be referred to them:—1st, a

to become familiar with which, it must not be concealed, requires nice discrimination and habits of close attention*.

The arterial system being universally diffused, and its action being uniform throughout, it follows that the pulse may be examined in every part of the body; but it can certainly be nowhere so conveniently, nor perhaps nowhere so advantageously, felt, as by the submaxillary artery (*glosso-faciale*, G.) as it crosses the anterior portion of the tuberosity of the lower jaw, as *seen at o, plate* III, and as more particularly described with the arteries. Having detected this vessel, enclose it within an angle formed between the fore and middle fingers and the thumb, the fingers being carried just within the ramies of the jaw, and the thumb resting without; which latter will form a fulcrum, while the index and median fingers, between them, pursue the inquiry into the state of the circulation, now by one, now by the other pressing the arterial tube with various degrees of force against the bone, or between themselves†.

A *strong* and *full* pulse, indicating forcible contractions in the heart, with

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pulse where the artery is too much dilated; 2d, where it is not sufficiently so; 3d, where it is too frequent in its motions; 4th, where it is too slow.' This, we presume, was intended as a directing point to the '*young practitioner*,' and was by no means considered as '*quite sufficient*' for all; otherwise this quotation would not have been premised by the following:—'It has often struck me that sufficient attention is not paid to the state of the pulse of the horse by the veterinarian; the quantity of knowledge to be ascertained by it being limited to the *quickness* or *slowness* of the pulsations, this being their chief guide in the use of the lancet; but the experienced practitioner well knows that the *quality* of the pulse will frequently inform him of the nature of the case, and be to him what the tongue of the human patient would be,—his director.'

* It was probably by confining the examinations to the mere number of pulsatory strokes in a given time, that the early physicians paid so little attention to the arterial beat: even Celsus himself regarded it as a *res fallacissima*, as did most of the eminent Greek physicians. Nor are there wanting eminent moderns who follow in the same track, being *misled* by the constitutional peculiarities which occasionally occur, as well as by certain states of the sanguiferous system, which, from causes unknown to us, present opposite indications to those laid down. But we caution the prudent veterinarian not to be thus misled: in the horse these discrepancies are less frequent than in the human; but as they do occur, he must be on his guard: he may rest assured, that in all general cases of active disease common to the horse, he may place much dependence on the criteria afforded by the pulse; and when it does happen that the pulse and other well known and strongly characterised symptoms present contrary indications, I would advise him to examine the case with renewed attention, and finally to let the *weight* of the united evidences guide his decision. To accustom himself to every variation from a healthy pulse, the young veterinarian should apply himself to a frequent examination of it in horses in *health*, and that under every variety of circumstance which may have a tendency to alter it either in different individuals, as age, sex, size, breed, &c. or in the same individual, as heat, cold, full feeding, or emaciation, &c. &c.

† I have before remarked, that this *point* for pulsatory examination I had never met with, either in the practice or the writings of any veterinarian, when I first pointed it out; since which it has, however, been very generally recommended, as it deserves, for the convenience of the situation of the vessels, its ready application to the hard body of the jaw, and as well as the readiness with which it may be examined under all circumstances. Bartlet directs the pulse to be examined by the leg, by the carotids, and by the heart. Mr. Clark describes it as most easily felt at the origin of the temporal artery, near the base of the ear; which, notwithstanding our respect for this gentleman's opinion, we have observed to be a most inconvenient and often impracticable situation. Attempting it here alarms many horses; neither is the temporal artery easily embraced for a critical examination; and it is altogether, in my opinion, even a more ineligible spot for the purpose than those which the metacarpal arteries afford. It is sometimes judicious to examine the state of the circulation at the fountain head; although it has been said that the *heart* only indicates the number of pulsations. I have had recourse to its action as an excellent guide in detecting water in the chest, by the peculiar undulating sensation produced through the watery medium. That irregular pulse also which indicates extreme debility

a proportionate quantity of blood forced into, and propelled onwards, by the arteries, is present in the horse under temporary excitement; but is seldom found to accompany any morbid state into which he falls, with an occasional exception in favour of some attacks of phrenitis, accompanied with delirium. The *full* pulse which accompanies disease in the horse has always some confined vibratory *hardness*, and seldom gives the full bounding feel present in inflammatory affections in the human; occasionally, perhaps, it may be met with in the first stages of membranous inflammation. In treating therefore on diseases, whenever the term *full pulse* occurs, it must be considered as intended to convey the above idea only. A *hard pulse* with increased *frequency* is the consequence of strong general sanguiferous action operating on a diminished diameter but strong resistance of the arteries, and is characterised by its feeling to the fingers like a cord vibrating under them, and not like the full undulations of an overcharged vessel. This pulse accompanies most extensive membranous inflammations, and is the usual attendant on the early periods of most visceral ones also. In the incipient stages of peritoneal inflammation of the intestines, or red colic, it forms the best characteristic between that and the spasmodic colic or gripes; for in the latter, although after a few hours' continuance there is often a wiry hardness in the pulse, it is always accompanied, when purely spasmodic, with a degree of fulness also, unknown to the other. A *hard* and *full pulse* is common to all extensive inflammations of parts not immediately essential to life, as of the cellular membranes, muscles, skin, &c. &c., when such inflammations are sufficient to affect the constitution. It accompanies the early stages of bad catarrhal affections, and occasionally of pneumonia also; but in the former it usually exhibits more frequency than in the latter. The *wiry pulse* is a very important modification of the hard, in which the sensation is contracted from that of a vibrating cord to that of a jarred wire, whence its name of *wiry*, *thready*, &c. It is commonly accompanied with increased frequency, but by no means invariably so; and is often present in the protracted stages of visceral inflammation, and in some few it accompanies them from their outset. It appears to be the common consequence of the former pulse, and thus succeeds to it so frequently in the secondary or protracted stages of all inflammatory affections of magnitude, particularly of such as commence slowly. The *oppressed pulse* is also a modification of the hard pulse, and appears brought about by the opposing efforts of the muscular and elastic

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is best examined by the heart itself: its dying flutters no arterial examination can afford a just conception of.

The *pulses of other animals* which may become the object of the veterinarian's care, present indications under disease not dissimilar to those met with in the horse, making allowance for the varied ratio of their pulsations in a given time. The favourable situation for examination is not the same, however, in all of them. In the *ox*, as in the horse, the submaxillary artery offers the most convenient spot; but it must be remembered, that the tuberous prominence of the jaw is less distinct in him, and also that the artery is to be felt for somewhat behind the situation in which it is found in the horse. In the *sheep*, the metacarpal arteries, the carotids, and coccigeal or arterial branches of the tail, may furnish pulsatory indications. In the *dog*, the auricular artery, which is one of the terminating branches of the external carotid, may be felt at the fore part of the root of the ear, and will readily furnish the pulse: in very large dogs, the metacarpals may also be felt for the purpose: in very small ones, examine it by a femoral branch, which traverses the inner side of the thigh in an oblique direction, sometimes higher and sometimes lower, but may be always detected by care. In all small animals, however, the irritability of the system hurries the circulation so as to render it somewhat indistinct; and in them, therefore, it is often most satisfactory to examine the heart itself, by applying the hand to the left side of the thorax.

portions of the artery; the efforts of the one appearing to be employed to restrain the distention forced on the other, by a congestion within some part *immediately concerned* in circulation. It is from this cause that it is so common to the active stages of pneumonia, or inflammation of the lungs; and it is probable that, when it is present also in other visceral affections, it arises from the secondary effect produced on the respiratory organs. When the difficulty is in a certain degree removed to the transit of the blood through the right side of the heart, by abstracting a large quantity of it, and thus removing the congestion, it is remarkable how this oppressed pulse, creeping, labouring, and often slow, will rise into a more full, free state, but still with remnants of its parent hardness remaining; and as long as such alteration is produced by bleeding, it is prudent to pursue it.

A *small pulse* is usually present in all cases of great debility, and is generally attended with increased frequency. When it is very small and thread-like, it shews that the debility is extreme, and prognosticates a fatal termination of the existing disease, the heart and arteries attempting to make up by quickness what they want in strength: when this pulse varies in its regularity, and intermits, it is even more certainly a fatal prognostic. We must, however, be careful not to mistake between this pulse and the oppressed one last described, but to bear in mind that the distention of an artery may be so great as to overcome its contracting power, as any elastic body may be distended beyond its capability of recovering its original state: hence a *small* pulse, when wiry and oppressed, is not necessarily a sign of general debility: for in inflammation of the vital organs this distention of the vessels frequently takes place to such a degree as to prevent their natural contraction; and, to the untutored, an apparently small pulse is by this means produced: but if the over-distending column be relieved by copious bleeding, the over-stretched muscular coat recovers its tone, and can contract on its contents; and thus, in such cases, the pulse is found to rise on bleeding*.

A *quick pulse* usually denotes irritability of the system; but there may be natural or common causes for such quickness; as youth, diminutive size, fatigue, a hearty meal, or a particular temperament. But when none of these natural causes are present, great quickness of the pulse indicates a diseased irritability of the vascular system, and often a want of power also.

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* When there is any doubt in the mind about these opposite, though, to some, apparently similar states of the pulse, error may be always avoided by a practice which, not only in this, but indeed in all cases of abstracting blood under active disease, should be pursued; which is that of carefully examining the pulse at minute intervals during its flow. I commonly kept my fingers pressed on the artery during the whole operation; by which precaution all danger of prejudicial bleeding is avoided: a pulse of pure debility will waver more and more as every half pint flows: a pulse of congestion, however oppressed and apparently debile, will become fuller, softer, and more free; and in such cases the flow of blood should be continued as long as the benefit or salutary alteration in the pulse is manifest. This rising of the oppressed pulse by abstracting blood may be exemplified by the urinary bladder, which we know will become, under long retention, so distended as to be incapable of contracting on its contents; and that, unless it be artificially emptied, the muscular coat will give way and burst. It is further probable, that an inflamed part is not in a state of increased strength, though it is in one of increased action, but the contrary; for as the vessels are preternaturally distended, they are in consequence weakened: hence, in some local inflammations, or where the vessels of a part only are under this state of increased action, topical bleeding, by emptying these particular vessels, will often prove highly useful; while, on the contrary, general bleeding may in the same case be prejudicial, because, by weakening the system in general, it must still further weaken those particular vessels, as a part of that system, and thus render them less able to contract. We may therefore learn, that instances do occur where diminishing the general strength may augment the inflammation.

But its indication becomes very different as it is accompanied by fulness or smallness: thus, when the frequency of the pulse is considerable, with an increase of strength in the action of the artery, it may be gathered, from what has already been said, that it betokens inflammatory action, general or local.

A *slow pulse* may be occasioned by pressure on the brain from the effect of accidents, or from congestion or effusion, as in lethargy, sleepy staggers, epilepsy, &c. It may also be brought on through the medium of the stomach by various substances taken in. White and black hellebore, aloes, digitalis, hemlock, and whatever excites nausea, decreases the frequency of the pulse in the horse, as in the human. But, unfortunately, in the horse our means of exciting this sensation are usually limited to such matters as are in themselves sources of great irritation, and hence hurtful. The pulse may be also diminished in its frequency by cold; but at the same time it is apt to be increased in strength. We must likewise bear in mind that a simple alteration in the frequency is not all that is necessary; to a beneficial end, we should render the pulse *soft* also, without which a slow pulse may retain its inflammatory base, as we witness in the lethargy of staggers.

A *soft pulse* is, in all its characters, the reverse of the hard, and exhibits also much difference from either the full or the oppressed: here, the artery opposes little resistance to the fingers, but seems to allow a due volume of blood to flow through it without labour or interruption. This pulse is frequent at the decline of inflammatory affections, and usually shews the cessation of that diathesis; thus, after the hot fit of fever is removed, the pulse from being hard becomes soft. Suppuration, as a termination of inflammation, also produces it; and whenever there has been great local inflammation, and pus forms, a soft pulse is generally the consequence.

A *regular pulse* is occasionally found when disease is present; but it is usually under such circumstances increased in its hardness or softness. A regular pulse, with a proportionate fulness, is one of the strongest marks of health; as an irregular one usually betokens acute disease: irregularity in it may, however, exist without acute morbid states, and may depend on organic affections; as peculiarities in the circulating system, or on disease in the heart or its principal vessels. *Irregularity* in the pulse, in other cases, is a mark of irritability, and characterises debility also. In inflammation of the heart there is usually a peculiar irregularity in the pulse with extreme oppression and smallness. An *irregular pulse* in fever shews great danger; it also accompanies the fatal terminations of all inflammations, topical or general. The worst cases of pleuritis and pneumonia commonly present it before the close; and in some also without an immediate or acute termination, a very singular irregularity is often present, from a large quantity of serous fluid formed within the chest; in which cases, besides its intermission, the pulse appears as though undulating through a bladder of water. This pulse should be particularly noticed, as, when once become familiar with, it affords an unerring guide to the state of the patient.

The Distribution of Arteries.

The *aorta*, the principal vessel of the arterial system, rises perpendicularly from the base of the left ventricle of the heart, between the vena cava, pulmonary artery, and the trachea: having proceeded about two inches, it divides into two branches, opposite the fifth dorsal vertebra, one of which is carried forwards to furnish the head and extremities; the other proceeds backwards, to be distributed to the rest of the body, but exhibits no incurvation, as in the human. These divisions form the anterior and posterior aortas; but previous to this division, the original trunk has given off a pair of small arteries immediately at its origin, under the semilunar valves, called the coronaries.

The *anterior aorta* is continued single to between the second and third rib, where it divides into its right and left branches, called by Mr. Percivall *arteriæ innominatæ*. The *left division* gives first a small branch to the pleura, next the dorsal; then two others, which penetrate between the first, second, and third ribs, under the names of anterior and posterior cervicals: from this, passing towards the first rib, it gives off the left vetebral*, and the internal and external pectorals: when, bending its course over this rib, it takes the name of axillary. The *right division* of the anterior aorta is much larger, as well as longer, than the left. In its course, having furnished some considerable branches which mainly correspond with those given off to the left side from the left division, it takes the name of *carotid;* when directing itself forward, it bifurcates into the *right* and *left* important vessels of this name: the continuation of this right division of the aorta gaining the edge of the first rib on the right side, forms the right axillary.

The *axillary arteries*, as furnishing the whole of the fore extremities with blood, must be deemed very important: the *right* originates as above; the *left* springs from the left branch of the anterior aorta. The trunk of each curves over the first rib, to reach the axilla of each side, from whence we shall trace one only. From the axilla, the artery passes out at right angles with the head of the humerus to the glenoid cavity, where it takes the name of *humeral* or *brachial*, and in its passage gives branches to furnish the scapula. Two principals may be called *scapularis inferior* and *scapularis superior:* another distributed about the articulation of the scapula with the humerus, is called *arteria articularis*, or *humeral thoracic*. The *humeral* or *brachial artery* descends along the internal surface of the humerus, giving a considerable ramus that penetrates the biceps extensor cubiti: here also it often parts with a branch which ramifies over the ribs, behind the fore leg, in the seat of the spur vein. Mr. Percivall calls it the *external thoracic*. Having arrived at the inferior and anterior part of that bone, near its articulation, the brachial makes a fresh division, giving sometimes one, at others two considerable branches; one which passes between the ulna and radius, and one also called by Mr. Percivall the *spiral*, which ramifies around the elbow joint. The *ulnar artery* proceeds posteriorly between the two bones, and down the lateral external part of the fore arm, giving medullary branches to both the ulna and radius; and rami to the muscles of this part, anastomosing at the knee with a branch of the radial, and continuing often in a small branch down the cannon. The *radial artery* first gives off a branch that passes between the condyles of the radius, in company with a vein immediately under the extensor pedis anticus, and over the extensor metacarpi radialis, and is distributed to the anterior part of the knee. The main trunk is then continued downwards under the muscles, inclining behind the radius; penetrates the ligaments, and passes within the arch of the pisiform bone; in which passage it usually gives off a branch which Mr. Percivall names the *small metacarpal:* it often accompanies the metacarpal vein, giving off rami around, and anastomosing freely with the other branches of the radial.—The *metacarpal artery.* Continued down, and penetrating the sheath of the flexor tendon, the radial trunk takes this name, and in company with the metacarpal nerve is continued on the inner side of the flexor sheath; gaining the under portion, and descending in front of the bifurcating suspensory ligaments. At the lower part of the cannon, accompanied by the metacarpal vein and nerve, it divides just above the fetlock into the two next trunks.

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* The *vertebrals* are two important arteries, arising from the divisions of the aorta we have described: they are given off opposite the first rib, and pass under the transverse process of the first dorsal vertebra, insinuating themselves between the sixth and seventh cervical, and are continued upwards through the foramina at the base of the transverse processes of the remaining six of these vertebræ: as they pass, they send off small branches through the lateral notches in the vertebra to the spinal marrow, and likewise to the muscles of the neck. Approaching the head, they give a small ramus, which usually passes through a foramen in the oblique process of the atlas to communicate with the external carotid, by which a communication is kept up between these vessels. After they have made a number of inflections, apparently to retard the circulation, they unite, and form the *basillary* artery, which runs on the inner surface of the cuneiform process of the occipital bone, and is finally ramified in the cerebellum, first giving a branch which unites with a similar one of the carotid to form the *circulus arteriosus*.

The *pastern*, or according to Mr. Percivall the *plantar arteries*, do each of them pass over its opposed sessamoid bone, behind the vein at the lateral part of the pastern, tending rather posteriorly. The nerve which accompanies each is situated posteriorly to it; so that the artery passes between its fellow vein and nerve, which is of importance to remember in some operations on these parts, particularly in that of neurotomy, lately so much practised. (See *Plate of Feet;* see also *Neurotomy.*)—These arteries from hence are continued downwards to be further distributed, as will be shewn by note below*.

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* In the former editions, I pursued the arterial distribution into the feet according to my own dissections, and, I believe, with sufficient correctness: but my limits necessarily curtailed the account. Mr. Percivall, aided by the accurate demonstrations and writings of Mr. Coleman, has been enabled to carry the subject farther into detail; and as it is a matter both interesting and important to the student, I prefer pursuing it in his words to my own: in doing which, as our objects are the same, the benefit of the veterinary art, I am persuaded I shall stand excused by him, as well as the reader. 'The large metacarpal artery, which may be regarded as the continuation of the radial trunk, continues its course down the leg by the side of the tendo perforatus, passing with it at the knee under the posterior annular ligament, inclosed with a cellular sheath of its own. As it proceeds, it inclines to the side of the tendo perforans, and, in approaching the fetlock, gets in advance of that tendon: just above the joint, where it is situated between the tendo perforans and the suspensory ligament, it splits into three vessels. The middle division gets between it and the bone, forms a transverse arch, from which three recurrent arteries retrace, in a flexuous line, the suspensory ligament, and form communications with the small metacarpal artery: the lateral divisions become *the plantar arteries.* From the arch below come off two lateral branches, which descend into the joint.

'The plantar arteries, *external* and *internal*, in the fore extremity, result from the bifurcation of the metacarpal: in the hind, from that of the metatarsal artery. Their general distribution is the same, both in the fore and hind feet. These arteries, in emerging from their origin behind the flexor tendons, descend the fetlock upon the sides of the sessamoids, in company with their veins, which run in front of them, and with the plantar nerves, which proceed behind them: in this part of their course they describe corresponding curves outward, to conform to the prominence of the fetlock, and henceforward pursue the same uniformity in course and distribution, so that we need only for the future make mention of one. In its passage over the sessamoid, the outer edge of that bone rises between it and the flexor tendon; but, in quitting the fetlock, the artery again approaches the tendo perforatus, and runs beside it to its termination in the head of the os coronæ, at which place the artery sinks behind the cartilage into the substance of what is called the "*fatty frog.*" Inclining forward in its subsequent descent, the artery next passes the inner and upper extremity of the ala of the os pedis, where it enters a groove, which conducts it, obliquely forward and inward, to the foramen in the posterior concavity of the bone. Here we lose sight of it altogether; the knife and forceps no longer avail us to discover its progress and destination. To effect this, either the bone should be chiselled away, or (the vessels being previously injected) be eroded by maceration in an acid: we shall then detect the artery in the interior of the coffin-bone, making a turn outward again, and sub-

The *carotid* common trunk arises from the right branch of the anterior aorta, and soon divides into two portions. Each carotid is a very long vessel, whereby the strong action of the heart is counteracted; and the head of the horse is less liable to congestion than our own, where these vessels are so much shorter. As it approaches the head, it divides into what are termed the external and internal carotids; which designation they receive more from the parts they furnish than from their immediate situation.—The *internal carotid* enters the skull by a large foramen near the junction of the sphenoid with the cuneiform process of the occipital bone: by its tortuosities its contents cannot be too much accelerated; nor by this contrivance can accidental pressure deprive the brain of its support. As it enters the base of the skull, it gives a branch, which uniting with a similar one from the vertebral, forms the *circulus arteriosus*. It anastomoses likewise with the internal carotid of the other side, as well as gives branches to the adjacent parts, as the *anterior cerebral* and the *ophthalmic:* finally, it ramifies throughout the anfractuosities of the cerebrum and cerebellum.

The *external carotid artery* first bends downwards behind the angle of the jaw, then, crossing the large membranous opening of the fauces, it is directed under the parotid gland towards the hindmost part of the branch of the jaw, and bifurcates immediately behind the neck of the condyle[*]. The branchings of the external carotid are, according to Mr. Percivall, 1. The *submaxillary*[†], which divides into the facial and inferior labial, having

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sequently another inward, in the course of which it meets with its fellow; the trunks then coalesce, and, in so doing, form an arterial semicircle corresponding to the circumferent line of the edge of the os pedis, which has been very properly named, by Professor Coleman, the *circulus arteriosus*. The plantar vessels and nerves are invested, on their descent to the foot, by cellular substance, which connects them loosely with the parts around.'

The branches which the pastern or plantar arteries furnish in their course are numerous: many rami are distributed to the flexor and extensor tendons. The *perpendicular* artery, as named by Mr. Percivall, is one of these, and descends on each side of the os suffraginis, when, uniting with its fellow, it forms *the superficial coronary arch*, furnished with eighteen arterial branches which run over the coronary venal plexus: from these, it is thought by Mr. Coleman, the crust of the hoof is secreted. The transverse artery is a branch which proceeds directly across the coronet to join its fellow: thus united, they form an *inferior coronary arch*. Posteriorly is seen *the artery of the frog*, which descends through the substance of the fatty frog, and, dividing, passes down on each side of the cleft. The *lateral laminal artery* proceeds within a groove to the front of the coffin, furnishing the laminæ with rami. The *anterior laminal arteries* make their exit from the foramina, and, communicating with the last, are similarly distributed. The *circulus arteriosus* is a vascular congeries, resulting from branches derived from all the foregoing trunks: from it are given the *inferior communicating arteries*, which are, according to Mr. Coleman, thirteen or fourteen in number. The *circumflex artery*, which encircles the toe, and the *solar arteries*, which radiate over the sole, and supply that with blood as the others, are principally distributed to the parts in front of the coffin.

[*] As Mr. Percivall observes, it is so imbedded in glandular matter, that it is not safely accessible to the knife at any other part than rather more than an inch below and behind the condyle, where it is only covered by a thin portion of the parotid.

[†] This vessel, which I have hitherto called the external branch of the internal maxillary, is important in practice, as it forms the most convenient part for the examination of the pulse. It is seen in *plate* III at *o*, and also in *plate* IV, where it is the middle vessel of the three seen coming from under the jaw. Mr. Percivall says, 'it comes off behind the corner of the os hyoides, just as the carotid is going to make its second curve, and ranks next in size to the trunk itself. It takes an oblique course downward and forward within the submaxillary space, preserving, at first, the line of the corner; it then crosses the lower portion of the pterygoideus, and reaches the posterior border of the branch of the jaw, about one-third of its length downward, which it turns round to arrive upon the face: here it becomes subcutaneous, distinctly perceptible to the feel, and very conveniently compressible, on which account it is now the vessel ordinarily selected for examining the pulse by.'

first furnished the ascending pharyngeal, the lingual, the ranine, sublingual, submental, and anterior masseter branches. The inferior labial is spread over the lips. The facial spreads itself over the upper and fore part of the face, and gives branches to the masseter muscle. 2. The parotideal branches to the parotid form the next division of the carotid. 3. The pterygoideus. 4. Posterior masseter. 5. The posterior auricular, which, emerging from beneath the parotid gland, directs itself to the back of the ear, and furnishes the concha. 6. The trunk of the external carotid may be now considered as ending in the temporal*, the anterior auricular, internal maxillary, and occipital branches, which are distributed to parts corresponding with their names.

The Posterior Aorta.

This large and important vessel furnishes blood to all the parts of the body posterior to the chest. It curves upwards and backwards, opposed to the fourth dorsal vertebra, between the pulmonary artery and the branching off of the trachea; inclining in its course to the left side of the vertebræ (see *plate* IV), having the œsophagus to its right and the thoracic duct to the left. In the thoracic passage of the aorta it gives off the bronchial, the œsophageal, the intercostal†; and as it enters the abdomen between the crura of the diaphragm, it leaves the right and left phrenic. The cœliac‡, which, in most instances, is the common trunk of the splenic, gastric, and hepatic arteries, is often the first true abdominal branch of the aorta. The right branch of the gastric spreads its ramifications over the great curvature of the stomach, and the left over the lesser, inosculating with each other, and with the coronary. The hepatic artery is sometimes derived from the pancreatic, which, in that case, owes its origin at once to the aorta; at others, the hepatic forms a considerable branch of the cœliac: in either case, in its course to the liver, it gives a branch to the duodenum and the coronary branch which supplies the pyloric extremity of the stomach. The *mesenterics, anterior* and *posterior*, are two considerable branches given off from the aorta; the first, directly after the cœliac; the last, which is smaller and longer, arises farther backwards, and, according to Mr. Percivall, is the last of the abdominal arteries. The *anterior* is distributed to the mesentery and small intestines, giving a small branch to the pancreas: the *posterior* furnishes the large intestines and mesocolon. The mesenterics anastomose freely with each other by a particular branch, and surround the intestines, so as to form a network of vessels. (*Vide k, plate* IV.) The *emulgent*, or *renals*, are the next aortic branches to the anterior mesenteric, and are very considerable trunks (see *plate* IV), where they may be traced immediately *under* (allowing for the situation of the animal) the emulgent veins marked (*i*). Given off at right angles from the aorta, each at once reaches its appropriate kidney*, giving off in its passage a branch to supply the renal capsules. The *spermatics* follow next in order, and may be seen in *plate* IV, parting from the aorta, 'about midway between the origin of the renals and its bifurcation†.'—The *lumbar arteries* are usually five or six small pairs, which arise from the superior part of the aorta, and are distributed to the spinal canal and lumbar muscles.

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* The temporal artery is also sometimes the object of an operation in abstracting of blood from the head, and therefore its situation should be familiar to the veterinarian. Mr. Percivall says, 'it leaves the carotid just as it is emerging from the depth of the parotid gland; curves upward and forward around the neck of the jaw, a little below the condyle, which serves as a guide to cut down upon it: from this it runs in a straight line towards the outer circumference of the orbit, just opposite to which margin it dips into the substance of the masseter, so as to elude further trace without the aid of dissection.'

† The first three or four of these vessels are furnished from other sources; the remainder are supplied in pairs from each side of the aorta, and are continued on the inner surface of the intercostal muscles at the posterior edge of each rib, furnishing the intercostal muscles in their course. Anastomosing extensively with the pectorals and epigrastics, they also give rami to enter the vertebral canal. It is therefore evident, from this distribution, that, in any operation on the ribs, we should be cautious to avoid cutting on their posterior edge, or a dangerous hæmorrhage might ensue.

‡ This vessel sometimes originates in a manner that would render the name *splenic*, as it stood in the former editions of the VETERINARY OUTLINES, most appropriate: for although the cœliac of the human is a common trunk to the splenic, gastric, and hepatic branches, in the horse this trunk, though tributary to the stomach and liver, usually continues its principal blood to the spleen. But to simplify our nomenclature to one common standard is so desirable, that I am anxious always to adopt that which is likely to come into general use.

The *iliac arteries.*—When the aorta has arrived to about the fifth lumbar vertebra, it first gives off the two external iliacs, and in about three quarters of an inch more, the trunk divides finally into two larger divisions.—The *internal iliacs*, so called from their pelvic situation and distribution. The first to notice is the artery of the bulb (*artère bulbeuse*, Girard) sometimes given off before the iliac division, but always near it. It bends itself within the pelvis, furnishing the umbilical, some vesical rami, the prostatic in the male, and vaginal in the female, when it ramifies in the bulb of the penis in the horse, and of the vagina in the mare. The obturator often follows next, which traversing the pelvis, divides into the ischiatic, sacral, and pudendal, by which the organs of generation in both sexes, as well as the other pelvic viscera, are partly furnished.—The *external iliacs* travel more externally, and having gained the brim of the pelvis, they proceed one on each side down the iliac muscles towards the Fallopian ligament, in which course each gives off a *branch to the psoas* and abdominal muscles.—The *epigastrics* are given off within the pelvis; run obliquely upon the tendon of the transversalis, pass forward on the abdominal muscles, and then ramify with the internal pectoral.—The *arteriæ profundæ*, given off sometimes within and sometimes without the abdomen, run down on the inside of the thigh, to be distributed to the muscles of the upper part of the extremity.—The *external pudendals* go out by the crural arch, communicate with the internal pudendals, and are distributed to all the external parts of generation, giving branches to the inguinal glands: they are then carried along the penis, to be finally ramified throughout the glands: in the mare it furnishes the mammæ, or bag.—The *crural* or *femoral arteries*, passing out of the abdomen at the crural arch, accompany the psoas muscles. Each descending along the lateral internal part of the femur, passes for some way in company with the crural veins between the pectineus and sartorius muscles, to about the middle of the femur; where passing obliquely, it gains the posterior part of the thigh, and is continued down behind that bone. In its passage, as already mentioned, it sometimes gives origin to the profunda, and usually furnishes small branches to the neighbouring parts, one of which makes a turn backwards to furnish the acetabulum and muscles around it, anastomosing with the profunda. Pursuing its course, the femoral artery accompanies the vein and the crural nerve; at length it reaches the hollow at the back of the stifle, where, opposed to the head of the tibia, it divides into the posterior and anterior tibials.—The *posterior tibial* artery is continued down the posterior internal part of the tibia, under the flexor minus pedis, accompanying the vein, and likewise joining the nerve in its course, through a groove formed by the calcaneum (*vide* IV, *fig.* 1, *plate of the Posterior Extremities*), in company with the perforating tendon of the flexor pedis muscle: it here gives several branches, some furnishing the hock, others the muscles and skin: another branch, continued down on the inner side of the internal metatarsal bone, may be called the *internal metatarsal*, which is finally ramified into the integuments and parts at the posterior of the cannon and pastern, anastomosing freely with the next, or anterior trunk.—The *anterior tibial* forms the other division of the femoral, and runs from between the condyles of the femur obliquely to the external superior part of the tibia, passing between it and the fibula, in company with the vein (*vide* 15, *fig.* 2), where the artery takes its course under the extensor longus pedis; and again becomes evident between its tendon and that of the lateral extensor, passing with them under the annular ligament, giving a branch to furnish these parts, and another that passes backwards to anastomose with the posterior tibial. It here changes its name to the *external* or *principal metatarsal artery;* which passing from under the ligaments of the hock, is continued down obliquely over the front of the cannon, towards the outer small metacarpal bone (*vide* 3, *fig.* 2), penetrating between it and the cannon, to be continued on its inner side under the flexor tendons, anastomosing in its passage with the internal metacarpal. Accompanying the nerve and vein, it gains the superior part of the sessamoid bones, when it bifurcates into the two *pastern* or *plantar arteries*, following, in company with the veins and nerve, a similar distribution with those of the fore extremities.

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* By a rectilinear origin, the circulation of the blood within the kidneys is retarded, which must be presumed favourable to their secreting offices: the right emulgent is considerably longer than the left, on account of the situation of the aorta, and the necessity of its passing over the cava (see *plate* IV). It is likewise usually anterior to the other, from the left kidney being pressed rather backwards in most subjects, by the body of the spleen. As these vessels enter the renal fossæ, they branch out into three or four divisions, before they imbed themselves within the substance.

† The spermatics are remarkably long, compared with their size: connecting themselves to the spermatic veins by cellular tissue, they are continued down to the internal abdominal rings, where they cross the ureters in their passage; and each, having joined the vas deferens of its corresponding side, the united rope receives the name of the *spermatic cord*, and proceeds to the testicle. In *plate* IV, they may be distinctly seen. As they furnish blood for the seminal secretion, it is evident that a division of these arteries as effectually castrates as removing the testicles themselves. In mares these vessels arise in the same manner, but do not in them pass out of the abdomen, but run within the layers of the broad ligaments, to be distributed to the ovaria and Fallopian tubes.

The Pulmonary Vessels.

The passage of the blood through these vessels is termed the *minor circulation*, and is effected by the pulmonary artery and veins. The pulmonary artery is a trunk of five or six inches in length, given off from the right or anterior ventricle of the heart, to be continued upon the side of the aorta to its division; where it is connected with that artery by means of a membranous canal, called *ductus arteriosus:* immediately after which it divides into the right and left branches, the right* being more considerable than the left, in conformity with the additional lobe of the right lung. Each of these branches is divided upon its entering the lungs into others, which ramify throughout the parenchymatous substance in every direction. From the minute distributions of the artery, the blood is received by the ramifications of the pulmonary veins, when the venal recipient branches increasing gradually, unite into four, five, and occasionally six principal trunks, which all terminate in the left auricle of the heart.

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* By a *verbal* error, *left* was introduced for right throughout the early editions: that it was a verbal error only is clear, from the anatomical history of the lungs, &c. &c. which followed.

The Veins generally.

Veins correspond with arteries in their common office of carrying the blood; but with this difference, that the arteries distribute their blood from the heart to every part of the body, and consequently diminish in their individual diameter as they advance: whereas the veins bringing back the blood from the parts the arteries had carried it to, and restoring it to the heart, gradually enlarge in their calibre as they advance. They may, therefore, be considered as canals arising in every part of the body, and terminating in the heart. Their membranous fabric is thin, but tenacious and elastic, as we know by their resuming their original size after distention by exercise. Their number is greatly superior to that of the arteries: in some few instances, as in the lungs, the proportions are equal; but in other parts liable to pressure, as in the extremities, the veins infinitely exceed the arteries in number. It appears to be to obviate the obstruction which might arise from pressure on their nonresisting caliber, that we find them distributed in two orders, a *superficial* and a *deep-seated*, which communicate freely with each other by anastomosis*. The superficial order runs immediately under the skin; the deep-seated accompany the arteries, and usually lie alongside of their trunks. As a farther guard against continued obstruction, as in the jaws, they in some cases enlarge into sacs. The want of solidity and resisting power in veins is compensated by internal membranous projections, which form valves†.

The physiology of veins is probably not well understood by us: at the present time their functions are supposed to be somewhat connected with those of the absorbents* (which see); we however are acquainted with some of their origins. One is from the inner surface of cells into which the arteries have previously terminated, and likewise from larger cavities or sinuses: and again by direct continuity of canal with minute arterial branches. A more complex origin is derived from the termination of other veins, as the vena portæ. Veins are furnished with arterial blood for their support, by the vasa vasorum, which is returned by minute venæ venarum: they have also nerves, and without doubt possess absorbents. The blood within the veins is returned to the heart by a regular flow, at least no pulsation has ever been satisfactorily detected; nor have the veins, that we know of, any contractile power beyond their elasticity.

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* By accelerated exercise the venous blood is forced into the superficial veins from the deeper seated; and it is this vascular turgescence that painters seize on and depict in their representations of horses, either in action or immediately after it; by which nature is followed, and great force, beauty, and strength given to the picture. But inexperienced artists, seeing this, have fallen into great error; for it is not unusual to see two portraits of the same horse, one under circumstances of the greatest exertion, the other perfectly at rest, with each the same number of superficial veins, swelled and prominent alike. A familiar and practical illustration of the effects of pressure on the superficial order, by anastomosis, may be given in the words of Mr. Percivall: 'If you are drawing blood from the shoulder of a horse, and you take up the other fore leg, you know that the blood will flow in a much freer stream than if you allow the animal to favour the limb from which you are taking it; for, by making him exert the muscles of the bleeding leg, the blood is pressed from the deep-seated into the superficial veins.

† A valve appears a parabolic duplicature of the inner coat of the vein, raised into two and sometimes three folds in the horse (in the human there are invariably two only): of these, one edge adheres to the side of the vein the most remote from the heart; the other, and nearest the heart, is free. By this formation the blood passing forward, keeps the vessel continually open; but when, by pressure, the fluid is stopped in its course, the valve being pressed backward, expands, and prevents its return. Valves are not distributed equally throughout the venous trunks, though they are more universal in the horse than in man: in some they are numerous, in others they are entirely wanting. They are found in most of the cutaneous veins, and in most of those of the extremities, except the feet; there are also but few in the viscera, nor are there any in parts where the circulation is necessarily very slow, as in glands.

Of particular Veins.

The original trunks in the horse are the *anterior* and *posterior cavas*, the *pulmonary*, and the *venæ portæ;* which, according to Girard, may be considered as forming three distinct systems; a *general*, a *pulmonic*, and a *chylo-hepatic*. In this detail I shall, without reference to the course of the blood within them, commence a description of the veins as vessels originating in the heart, and, like the arteries, distributed throughout the body from thence.

The *anterior cava* arises from the right auricle: opposite to the first rib it divides into four principal trunks, two of which (the axillary) go off at right angles, and two at half right lines with itself, which are the jugulars. But previously to this it has parted with the *vena azygos*, which passes on the right side of the dorsal vertebræ, and receives the blood from all the posterior intercostals on each side, and of the *vertebrals* also, which are given off opposite to the second rib, and pass at the base of the transverse processes of the cervical vertebræ, giving branches between these bones in the same manner as the artieries whose blood they receive, and anastomosing with the jugulars. The other early branches are the superior intercostal, the dorsal, mediastinal, superior diaphragmatic, and internal pectoral, whose mode of origin frequently varies.

The *axillaries* are two principal trunks, which having passed over the first rib, each gains the humerus of its corresponding side near the articulation, where it receives the name of humeral, giving in its passage the external pectoral and some other minute branches.

The *humeral* descends towards the posterior part of the radius, where it takes the name of *radial*, in company with the artery; first giving a branch to the posterior part of the fore arm called *ulnar*, and sometimes a deep-seated one in front also; then passing down still contiguous to the artery, it anastomoses freely in its course with the cephalic, or superficial brachial, to be noticed anon, and is continued downwards with the artery; when it receives the name of *internal metacarpal*, as the united trunks of the other branch and the cephalic take that of *external metacarpal*†.

Besides these divisions of the deeper-seated vessels, there is a superficial order situated on the surface of the extremity, which we must now notice.

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* Les veines constituent la principal partie du système capillaires des organes, et prennent unè part très-active aux grands phénomenes de l'economic, à l'inflammation, à la sécrétion, et à la nutrition.—*Dict. de Med. et Chir.*

† In *plate* IX may be seen the plexuses and anastomotic branchings of the veins over the whole surface of the foot, whereby it is furnished throughout with recipients for the arterial blood after it has performed its nutritive functions.

The *superficial set* arises from the jugular, when travelling towards the point of the shoulder, and crossing the muscles of this part, it usually gives a cutaneous ramus to run directly in front of the arm; the principal branch is then continued inwardly towards the inside of the arm, forming what is termed the *cephalic*, or *plate* or *plat vein* (*vide n*, *fig.* 2, *plate* VII); and is that which farriers usually open in drawing blood from the shoulder or arm. The cephalic here receives a branch from the humeral, soon after which it in some instances bifurcates; in others, it is continued down in one superficial trunk on the inner side of the radius. Near the knee, it frequently likewise, divides into two, which surround the inner side of the joint, but unite again below it, and pass down on the outer side of the ligament, receiving branches from the integuments, and anastomosing with the deeper seated trunk: when arrived at the bottom of the cannon, it unites with the internal metacarpal, when the united trunks bifurcate to form the *external and internal plantar* or *pastern* veins, anastomosing together, as has been before described. The subsequent course of the veins, from the pastern downwards, is similar to that of the arteries, except that their branches are much more numerous; by which, and by the absence of valves in the veins of the feet, the evils of pressure, to which they are here peculiarly liable, are avoided.

The *jugulars*, one of the principal divisions of the anterior cava, run up one on each side the trachea; soon after their bifurcation, the cephalic, or plate vein, just described, is given off. Having given this branch, and furnished the parts in its passage with small rami (for we now describe one only), of which the principal is the *thyroid*, towards the head it penetrates deeper, and approaches the carotids: when arrived opposite the angle and tuberosity of the lower jaw, about three or four inches from it, it bifurcates into two grand divisions, within which bifurcation lies one portion of the parotid glands (see *plate* IV). The lower branch may be called the inferior division of the jugular, and the upper branch the superior division*. The *inferior division of the jugular* (see *plate* IV) corresponds with the anterior external jugular of the human, and is called the *internal* or *submaxillary*; passing inwards, it gives some small branches to the larynx and tongue, and then passes over the jaw to its outer side: running up the anterior edge of the masseter muscle (see *plate*), it gives a branch to the lips, while another enters a foramen in the posterior maxilla at the chin, with a branch of the fifth pair of nerves, and an artery. Passing up, it makes usually three principal divisions, at other times more, and sometimes less. The *first branch* gains the spine of the maxillary bone, and gives a ramus that forms the palatine vein; it then penetrates the orbit under the zygomatic process, dividing into several ramifications. The *second division*, which is the posterior of the upper bifurcation (see *plate* IV), passes inwards under the spine, to meet the temporal vein, with which it ramifies, and then gives a branch to form the *angular vein*, and sometimes likewise another that enters the skull: the other and most anterior portion of this superior bifurcation gives its ramifications to the nose. As this branch of the jugular comes under the jaw towards its outer side, it changes its name, and is properly the *external maxillary*, as it accompanies the maxillary artery. The *superior division of the jugular* passes up between and within the lobuli of the parotid gland, furnishing it with ramifications, and finally dividing into several branchings, not uniformly alike: frequently there are found three larger, and one or two smaller. (See *plate* IV, *where the larger divisions appear.*)

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* To avoid the evils of depending on analogies drawn from human anatomy, it must be remembered, that the distribution of blood to the head of the horse and man is different: in the former there is no internal jugular properly so called; but the vein performing the office of the internal jugular is a branch of the superior division. It is also worthy of remark how this vessel dilates under the masseter, and in other parts of its passage about the jaws, into sacs not unlike aneurismal enlargements of the arteries, purposely to avoid the effects of pressure arising from the almost incessant motions of the jaws in mastication, &c. &c.

The first of these greater divisions is considerable, and corresponds in office with the internal jugular of the human. It penetrates under the maxillary bone, and is the branch seen in the inner view of the head (*fig.* 2, *k*), entering by a foramen, at the base of the skull; sometimes it gives the temporal vein. The next branch furnishes the masseter muscle, in company with an artery, called the *external maxillary*. The third large division gives, at times, the temporal vein, which is that seen in *plate* IV (*f*); it passes under the spine of the maxilla, and anastomoses principally with the external branch of the internal or submaxillary. The other branches of this third division proceed towards the occipital bone, &c., and give rami to the inner part of the skull at the cerebellum.

The Posterior Cava.

The blood is returned from the lower extremities, from the abdomen, and from the thorax below the heart, by the vena cava and vena portæ. The vena portarum returns the blood of the chylopoietic and assistant chylopoietic viscera, which are those particularly concerned in the formation of the chyle; while the cava returns that from all the other parts. The *vena cava posterior* is sent out from the posterior and lower portion of the right auricle. It gives first the *coronaries*, and as it proceeds it is continued on the right side of the spine, inclining rather towards the aorta. Passing through the tendinous portion of the diaphragm, dextrally inclined, it gives two or three branches to this muscle: from whence it proceeds through the great sinus of the liver, where it joins the mass of hepatic veins. From the liver, the cava, having reached the loins, receives the *mesenterics*, *emulgents*, and the *right spermatic:* the *left* usually enters the left emulgent. In the mare the spermatics are given to the ovaria, but, in the horse, they accompany the artery out of the abdomen with the spermatic cord. The emulgents usually give the *renals*, and the *lumbar veins* receive the blood given by the arteries of that name.

The cava having arrived at the termination of the lumbar vertebræ, bifurcates: from which results the *external* and *internal iliac* veins. The internal furnish the pudicæ internæ, and sometimes the veins of the penis, and likewise the sacrals. The external iliac veins give off numerous lesser trunks, corresponding with the arteries of the same name. Other branches are the *glutei*, the *obturatrix*, and *pudicæ externa;* and a particular ramus to the muscles of the abdomen, as well as the *mammary* in the mare. Passing out of the abdomen with the psoas muscle, under the Fallopian ligament, accompanied throughout by the artery, the external iliac takes the name of crural, or *femoral*. The *crural* or *femoral vein* first gives a branch that principally forms the *superficial set* of the posterior extremities, called *saphena major*, and a smaller one on the outer side (not always present), called *saphena minor*.—The *saphena major* appears along the internal part of the thigh, just under the skin, giving branches to the integuments, and anastomosing with the posterior tibial, when, passing down the inner side of the leg, it usually receives a considerable ramus from the anterior tibial, and is then carried obliquely towards the inside of the hock, over the inner condyle of the tibia; at which part, passing over the bursa mucosa, it is liable, on the diseased enlargement of that capsule, to become varicosed, forming what is called blood-spavin. From this it gains the cannon posteriorly in a similar manner with the artery on the outer side; where, passing between the large and small metatarsals, it unites with the posterior tibial, giving branches to all the surrounding parts, and to the cannon, pastern, and foot.—The *little saphena*, when present, receives the blood from the external side of the hock and tibia, which it pours into the saphena major. The crural or femoral vein, having gained the posterior and lower part of the femur in the same manner with the artery, divides into two trunks, distinguished by the names of anterior and posterior tibial.

The *posterior tibial* accompanies the artery, receiving branches from the surrounding parts, and passing in a groove of the calcaneum with the tendon of the perforatus muscle (see *fig.* 1, *plate* VIII, *where the nerve that accompanies it is seen, and which shews its course*). From its passage at the posterior part of the hock it gives branches to the surrounding parts, and receives the name of *internal* or *large metatarsal.* It is then continued down the posterior part of the cannon, towards the inferior part of which it receives the saphena, and then, dividing with the artery, it forms the *pastern* or *plantar* veins, in the same manner as in the fore extremities.

The *anterior tibial vein* accompanying the artery, passes with it under the edge of the extensor longus pedis. In this course it gives a branch to the saphena, and then, furnishing the interior part of the hock, it passes down under the ligaments to its posterior part on the outer side, from whence it is called *external* or *small metatarsal;* when giving in its course branches to the surrounding parts, is continued to the pastern and foot; but it principally supplies the cannon and pastern, from whence downwards the venous blood is received in the same manner as in the fore extremities.

The Vena Portæ.

The *vena portæ* is formed from the veins returning the blood of the chylopoiëtic viscera, by branches which correspond in origin and distribution with the arterial trunks that furnished it; the veins, however, are more numerous, and their diameter greatly enlarged. Having united, they enter the *sinus* of the vena portæ, from the opposite extremity of which the other trunks branch out to carry their visceral blood into and throughout the liver. The trunks that bring the blood from the viscera are called the *abdominal portions* of the vena portæ; while those carrying it directly into the liver are termed the *hepatic portions* of the same vein. From this it is seen, that the vena portarum performs the office of an artery; resembling it by its termination in exhalent orifices and corresponding recipient veins. The blood, deprived of its bile in the pori biliarii, is returned by the extremities of another set of veins, termed *venæ hepaticæ*, which terminate in the vena cava, as we have noticed. In the human fœtus, and in the young of all quadrupeds that we are acquainted with but the horse and ass, there is a communication between the sinus of the vena portæ and the vena cava, by a canal termed *ductus venosus:* but in these it is wanting; and all the blood of their viscera circulates through the liver in the fœtal state.

General Remarks on the Vessels.

The bloodvessels, like other parts, are liable to diseases. A very general one affecting the arteries, is the *distention* they experience under inflammation, when the capillaries are made to receive red blood. They are, however, but little liable to *aneurism* or *ossification* in the horse, though now and then both have occurred. The division of a vein is not so dangerous as that of an artery, as it usually gives way to pressure, or to applications producing coagulation in the external orifice; which coagulation does not so readily take place in the arteries, from the greater impetus in the blood and the rapidity of its motion.

The principal diseases of the veins are occasioned by causes operating on them from without. One of these is called *blood spavin*, and is a simple distention of the venous trunk, from the resistance which the contained blood meets with in passing over a morbidly distended capsule at the inner and fore part of the hock. Another common disease of veins is an *inflammation of their coats*, usually the morbid effects of blood-letting, idiopathic phlebitis being rare in them. The veins of the feet are also liable to become varicosed from pressure and from inflammation, as in strains, cracks, grease, &c.

It has been a very ancient custom among ignorant farriers, to take up the veins in different diseased affections, or, what they call, to *bar a vein*, particularly in œdematous swellings; but which practice is founded in ignorance; for in grease, scratches, inflamed eyes and feet, which are the usual cases in which it is practised, it is evident that every thing that obstructs the return of the blood must highly aggravate the disease: if, therefore, instead of destroying a vein, they could in these cases add two or three, they might do much towards a cure.

The Absorbents.

The *absorption* of matters from within and without by a set of vessels destined particularly to that office is comparatively of late discovery; for though a vascular system distinct from the bloodvessels was long known*, yet its uses were not even conjectured at; until a milky fluid was discovered soon after eating, in such of these transparent tubes as originated from the intestines. These received the name of *lacteals:* some time after, others of these, which had been traced to arise from the body generally, and were constantly found filled with a thin limpid fluid, were named the *lymphatics*. Subsequent discoveries have, however, given reason to suppose that neither in structure nor functions is there any real difference between these two sets of absorbing vessels, but that both are destined to receive fluids from the various parts of the body, and to deposit them by one common destination in the blood. This process, called *absorption*, is considered to be a power *sui generis*, operated by the action of the vessels themselves. To effect this, their tunics or coats are necessarily very strong, and their powers are further assisted by valves, which are numerous and placed at convenient distances[*]. To compass their extensive office, they are divided into a superficial and a deep-seated set, both of which anastomose freely with each other: the former usually accompanies the principal external veins, while the latter is found near the principal arteries. Their living powers are great, from their plentiful supply of bloodvessels and nerves[†]; of which the phenomena of their great energy in health, and their readiness to inflame, as well as extreme sensibility under disease, are sufficient proofs.

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* As early as the time of Galen, lymphatic vessels were seen in a goat by Erasistratus, who considered them as a peculiar species of arteries. Eustachius discovered the thoracic duct in a horse, which he considered as an extraordinary vein *(vena sive pari)*. It was Riquet who first traced the chyle from the intestines into this duct, and thus became acquainted with its uses.

The *lacteal absorbents* are that part of this system which arises from the inner surface of the intestines, by means of the villi, and appear to be principally composed of numerous lacteal orifices, from whence they pass in minute capillary tubes obliquely through the intestinal coats to gain the mesentery, uniting as they proceed into larger trunks, which are continued through conglobate glands situated in it, and thence called *mesenteric.* During this course they are called *primary* or *original lacteals;* and as they again pass out of these glands towards the thoracic duct, they are called *secondary lacteals.*

The *lymphatic absorbents* are more universally though not equally distributed, some parts being more plentifully supplied with them than others; and although they have never been demonstrated in the brain, there is no reason to doubt of their existence in that, as in all the organs of the body, the cuticle (as is said), hair, and hoofs excepted. They arise from the cells of the universal investing membrane of the body, and from all the great cavities of the machine also; they likewise pervade most of the solids. The cutis is supplied with them, and thus various substances rubbed on the skin produce effects exactly similar to those arising from the reception of the same substances into the stomach.

The *lymphatics of the head and neck*[‡], of the fore extremities[§], of the hinder extremities[*], and those of the trunk externally and internally[†], are all furnished with a superficial and a deeper-seated set; all of which, including the lacteals, tend to one common source, through the receptaculum chyli[‡]; or otherwise at once into the thoracic duct[§], or its tributary branches.

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[*] Their valves are disposed in pairs, but not equidistant; some parts have few, and in some they are numerous. A valve does not appear to take on disease so readily as the vessel itself; from which it has been conjectured to be of a different structure to the internal surface of the tube itself. Farcied buds are said to be the ulceration of the obstructed lymphatic, intercepted by the valve: but now and then I have seen the valve itself form the bud, and more often a small lymphatic gland has received the infection and become enlarged. Valves tend to intercept the weight of the column, and thus assist their power generally; they also effectually prevent any retrograding of the lymphatic contents.

[†] Although nerves may be distinctly traced to ramify on their larger branches, yet some experiments go to prove that these vessels can act without the influence of the nerves.

[‡] From Girard we learn that the superficial lymphatics of the head and neck accompany the superficial veins, and pass through the sublingual and submaxillary glands. The deeper lymphatics of the nostrils, fauces, and palate, take the same course. The guttural and lymphatic glands having received these, allow lymphatic trunks to depart from them; some superficial, but most deep-seated, which latter pursue a course along the track of the trachea into the thoracic duct, receiving in their passage the more superficial ones of the neck and withers.

[§] The *lymphatics of the fore extremities* arise from the sensible parts within the hoof, and pass up on each side of the limb; the deeper-seated in company with the metacarpal and radial artery. The superficial principally accompanies the cephalic or superficial brachial vein in a considerable plexus (see *plate* VII), to reach the axillary lymphatic glands within the neck, which it penetrates in company with the deep-seated branch to again emerge; those of the left fore extremity being carried at once into the thoracic duct: those of the right terminate by the right axillary glands, and, instead of pouring their contents at once into the thoracic duct, form a short lymphatic trunk, which taking an oblique passage on the transverse process of the last cervical vertebra, terminates in the right axillary vein: occasionally it either joins the thoracic duct, or ends close by it. This adventitious aid is most important, for by its means an accidental obstruction in the thoracic duct is not necessarily fatal. M. Dupuytren bound it in several horses, some of

The *absorbent glands* are vascular oval bodies, intimately connected with the absorbent system, as well lacteal as lymphatic. Their size differs considerably; some are minute, others are much larger, as may be seen by what are called *kernels* in meat; their structure is cellular, and each has an investing capsule. When an absorbent enters a lymphatic gland, it first divides itself into several vasa inferentia, which ramify throughout the inner surface of its cell: other ramifications, or vasa efferentia, take their origin from the opposite sides of the same cell, to be continued forward; but what purposes are intended to be accomplished thereby we do not at present know, though it is a specific one without doubt; and which is rendered more probable by the circumstance that there are some stray lymphatics which pass over these glands, called vasa circuita, whose intention it is likely to be to transport a part of the lymph, *unaltered* by the glandular function. The absorbent glands of the lacteals are called *mesenteric*[||], and those of the lymphatics receive the name of *lymphatic* glands[¶].

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which died; but others preserved perfect health. In those which died no injection would pass from the lower part of the duct into the subclavian vein; from which it is reasonable to suppose that in them there was no additamentary short trunk or small lymphatic branches opening into the axillary or subclavian vein.

[*] The *lymphatics of the hinder extremities*, like those of the fore, are a superficial and a deep-seated set. The former accompanies the superficial veins, and are seen in great numbers with the saphena major. The deep-seated arise from the feet, and accompany the *bloodvessels*, receiving branches from both sides; when proceeding upwards they reach the inguinal glands, forming a large plexus, which communicates with the iliac glands: they now travel with the iliac vessels, to be delivered by appropriate trunks into the great chylous reservoir.

[†] The lymphatics of the trunk are numerous and important: those of the genital organs within the pelvis bend their course to the glands of the basin; while the inguinal glands receive those of the external generating organs. The general contents of the pelvis have numerous lymphatics, which proceed to the internal pelvic lymphatic trunk; the more superficial bend their course to the lumbar glands. This order of lymphatics of the parietes of the abdomen join the inguinal glands; those of the loins pour their contents into the lumbar glands. The superficial set of the chest reach the axillary glands, while those of the internal parts follow the track of the large bloodvessels to gain their ultimate destination.

[‡] The *receptaculum chyli (la citerne lombair* of Girard), the grand recipient of the lymphatics of the abdomen and posterior extremities, and the origin of the thoracic duct, arises near the root of the larger mesenteric artery, and is situated between the aorta and vena cava posterior, presenting a very variable figure and dimensions: it directs its course forwards into the thorax.

[§] The *thoracic duct* is the continuation of this chylous sac within the chest on the right side of the dorsal vertebræ between the aorta and vena azygos; it consequently receives the lymphatics from the posterior extremities, pelvis, parietes, and viscera of the abdomen, head, neck, withers, and left anterior extremity. 'As it leaves the vertebræ, it runs obliquely over the trachea and œsophagus, when, having reached the left side, it stretches forward to the beginning of the anterior vena cava, and terminates against the middle of the anterior border of the left first rib, in the base of the left axillary vein, sometimes into the left jugular vein, near its junction with the axillary.'

[||] The mesenteric glands are by no means similarly disposed alike in all quadrupeds; in some, as the dog, instead of being dispersed as in the horse, they are collected into one mass, called, after its discoverer, the *pancreas Assellii*.

[¶] The lymphatic glands appear, contrary to the quality of the valves, to be more disposed to disease than the lymphatic tubes: as we see by the absorption of cantharides in blister: some morbid poisons likewise, as the venereal in the human and the malignant epidemic in cattle, occasion abscesses in the glands, without affecting the vessels by which they passed. In the human subject the mesenteric glands are more prone to disease than the lymphatic, but in the horse the contrary is the case.

The Physiology of the Absorbing System.

Lymphatic absorption is a most important subject, not only in a philosophical point of view, but also as a knowledge of it greatly increases the efficiency of the healing art. Absorption was originally attributed to the veins, until the discovery of this system of vessels, when, by common consent and the weight of observation and experiment, it was attributed to the lymphatics. Of late, however, some of the most eminent physiologists have been disposed again to attribute some of this power to the veins, yet in a more partial degree than before; and the facts brought forward appear to support such a supposition[*]; but although the work of absorption may occasionally be performed by veins, it is certainly principally operated by the lymphatics; and until they were known, not only were we unable to account for many appearances that we now know the cause of, but we were unable to bring about many effects in the constitution now perfectly under our command. The functional effects of this system are abundantly active in the constitution at large; we are certain that the various organs of the body are continually changing, wholly or partially, their component parts, either for renovation or alteration. It appears to be the office of the arteries to build up new parts, and to repair the waste of others; but the old ones must be first of all pulled down and removed by *absorption*[†]. By this wonderful power the alveoli having lost their teeth, are taken away, when their sharp edges would injure the gums; the roots of the temporaneous teeth are thus absorbed, that their crowns may more easily give way: by this also the gubernaculum testis, having fulfilled its office, is absorbed, and the thymus gland likewise removed: it is thus the vascular cartilages are taken up by the absorbents, to make room for a bony deposit when the animal approaches maturity. By these the fluids as well as solids are continually changing, being taken up and carried back into the mass of blood, from whence they are afterwards re-deposited by the work of the arteries. It is by the lymphatics that the dead parts are separated from the living in sloughing and ulceration, and by them coagulable lymph and extravasated blood are removed. By the superficial absorbents, matters and even gases are received from without; the water held in suspension by the atmosphere is thus taken in, and hence grazing horses require little or no water, and more especially if not exposed to the heat of the sun, whereby evaporation or exhalation is promoted[‡]. It is by this inhaling power that some animals do not drink at all, being enabled to dilute their food sufficiently from this source. Hence likewise unfortunate mariners, deprived of fresh water at sea, wrap garments wetted with the salt water around them; when the absorbents refuse in a great measure the salt, but suck up the aqueous particles, and thereby lessen the thirst[§]. The functional office of the lymphatics is most important also in the preservation of life under casualties. Long fasting is thus borne; their capability of displacing the animal oil or marrow from the bones, and the adeps or fat from the body generally, is here employed to make up the want. Hybernating animals live during their torpidity by a slow absorption of the adipose matter; thus it is found in the instance of the torpid bear, that, however fat he may enter his seclusion, he returns lean and emaciated. The absorbents appear to own a power also of selection with regard to the matters they take up. The lacteals seem particularly and exclusively to employ themselves in the absorption of chyle, and the lymphatics also receive some matters and reject others. Besides the *healthy* and *ordinate action* of these vessels, they have an *unhealthy* and *inordinate* one likewise, which is of itself a sufficient proof that absorption is not an act of capillary attraction; if it were, their absorbing capacities would ever remain the same: but we on the contrary find, that sometimes they scarcely act at all, while at others they are empowered with even too much energy; and, as a farther proof of it, it is in our own power, by various means, to stimulate or rouse them to increased action. The serous deposit in the swelled legs of some horses is to be attributed more to a want of power in them than to the superabundant action of the secreting or depositing vessels, and this we know by the effects which follow an artificial stimulus applied in the form of exercise or friction.

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[*] Haller favoured the opinion that the lymphatics were only a peculiar continuation of the arteries or veins, and others have since adopted the same supposition. Dr. Majendie considers that there is a true distinction between the lacteals and lymphatics: the former he considers as real absorbents, but that they invariably confine themselves to the absorption of the chyle. Thus he supposes the villous surface of the small intestines to be formed. partly from these and partly from *venous* orifices; by which latter the remaining fluids are taken up.

[†] The ratio of action between the depositing arteries and the absorbing vessels varies according to circumstances, and according to different periods of life: in the young the balance is with the arteries, whose deposit during the growth of the animal is greater than the absorption: in middle life their actions appear to be equal, except when influenced by accidental circumstances: in old age the absorbents preponderate in activity, and remove the parts faster than they are regenerated by the arteries. The aged horse is seldom obese.

[‡] The epidermis it is thought by some physiologists is denied the power of absorption; and whatever passes through it is supposed to do so by imbibition; the cutis vera is, however, allowed by them to possess absorbing power in a high degree: if so, it must be by infiltration that matters from without are so readily taken in: a hand immersed in a given quantity of water, by an accurate test, is known to sensibly lessen that quantity. To superficial absorption, it has been objected that emaciated persons have never been known to receive benefit from milk baths, &c. &c.; but here there was no digestive assimilation to convert the matter received into chyle.

[§] This well known fact I think is in favour of epidermic absorption: were it mere imbibition, the muriate of soda would pass through the pores, and the benefits be destroyed.

To our acquaintance with the power we possess over the lymphatics the practice of medicine is greatly indebted; and although we own few means of lessening an undue absorption, we fortunately have many of increasing it. Mechanical friction is a most active and universal agent in stimulating the absorbents, as the hand-rubbing of horses proves in many cases: in an observation of this property originated the custom of beating a splint previous to the application of a blister. Mercury is a very active stimulant to the lymphatics, as many parts of veterinary practice testify. Pressure also increases their action; and thus we bandage the swollen legs and we girth the bodies of our horses, to promote absorption of the adeps and interstitial fluid. Exercise, by swelling the muscles, produces pressure, and thus exercise also removes swelled legs, and promotes absorption generally: our older farriers used to bind lead on their splents and spavins, that the pressure might promote their absorption. Cantharides has also an effect upon them: thus we blister swellings, exostoses, &c. A still stronger stimulant is the actual cautery; from whence arises the very common and free use of fire, in veterinary practice, to all obstinate and diseased enlargements. There is likewise a strong sympathy between the stomach and the absorbent system at large, whereby nauseating medicines increase their action powerfully. But of this we are not enabled to avail ourselves in the horse so readily as we can in the human: nevertheless, a nauseating effect is not wholly denied to some medicaments, as we know by the effects produced. Purgatives and diuretics promote internal absorption; for by removing the contents of the intestinal canal and increasing the urinary secretion, a call is made, which the absorbents obey, to repair the waste by taking up the fluids from other parts.

SECT. XIII.

NEUROLOGY.

The Brain and its Meninges.

AT the head of the nervous system stands the soft white mass contained within the cavity of the skull, called the brain*. Of its membranous meninges or matres, the *dura mater* is the most external, performing the double office of a support to the brain, and a periosteum to the cranial bones, to which it adheres strongly by its tendinous filaments. It forms several folds or prolongations; such is the falx which divides the cerebral lobes: other expansions form sinuses to receive the blood returned from the interior of the brain; and some are prolonged to line the orbits, cover the spinal marrow, &c. &c. The *pia mater* is a fine vascular web, externally smooth and internally villous, which immediately invests the brain, and enters its convolutions, as well as those of the cerebellum and medulla oblongata: it adheres to the dura mater by the veins passing from it into the sinuses; and its numerous fine bloodvessels pierce the brain in abundance. The *membrana arachnoidea* appears a very fine external lamen of the pia mater; so thin as to be compared to a spider's web, from whence it takes its name. It is spread uniformly over the surface of the brain, without entering into any of its convolutions, and is connected to the pia matter by a cellular substance.

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* I shall merely offer an outline of the anatomy of the brain, reserving my confined limits for anatomical inquiries more immediately connected with the practice of the art. The inquisitive student will find this subject more in detail in the works of Girard or of Percivall; and also in the Library of Useful Knowledge, No. 3, p. 75, where a popular but highly interesting description of it appears.

The *cranial brain*, by a natural division formed from its appearances, its situation, and its physiological phenomena, divides itself into two parts*. The *cerebrum*, the first and largest portion, is bounded anteriorly by the frontal bones, and inferiorly rests on the ethmoidal and frontal cavities (*vide a, e, f, pl.* III, *fig.* 1): anteriorly it is convex, and posteriorly nearly flat; and is divided longitudinally through its whole extent into two *hemispherical* portions, between which the falciform process of the dura mater extends. Its peripheral or *cortical* part is greyish, and exteriorly indented by furrows or convolutions, which in the horse are singularly deep. The interior and larger portion, called the *medullary*, is whiter and more tenacious than the outer. On separating the hemispheres, the *corpus callosum* appears, terminating in a species of *medullary arch*, and presenting, as it were, a nucleus to the cerebrum, and thence called *centrum ovale*. The *tentorium cerebelli*, a transverse septum which divides the cerebrum from the cerebellum, is separated into two portions. The dura mater laminates at the falciform process, to form a long triangular venous hollow called the *longitudinal sinus*, which extends to the transverse septum, where it bifurcates, and is continued double under the name of the *lateral sinuses*, which passing out of the skull, are then called the jugular veins. Two other cavities of an oblong form are called the *anterior* or *lateral ventricles*, one being appropriate to each lobe of the cerebrum, and extending throughout its length. These ventricles, naturally, contain a very small quantity of interstitial limpid fluid; but under any active excitement of the brain, as mad staggers, &c., the quantity is increased to two or three ounces, and is then often sanguineous. These cavities communicate with each other by a canal situated behind a medullary arch termed *fornix;* on removing which and laying open the ventricles, the vascular web or *plexus choroides* is seen, apparently destined to furnish the internal parts of the brain with blood, as the pia mater performs that office for the outer. As might be supposed, in all vascular excitements, local or general, this plexus is liable to be preternaturally suffused with blood; and in phrenitis it is often distended to turgescence. The lateral ventricles branch out into other cavities, called also ventricles; two remarkable ones are found in the tubular origins of the olfactory nerves. The *pituitary gland* is a spongy body of considerable magnitude in the horse, lodged between the sphenoidal folds of the dura mater in the centre of the cavernous sinus. The *pineal gland*, the *tubercula quadrigemini* of the cerebrum, most of the remaining *eminences, processes*, and other minor peculiarities, may be learned by a reference to the description of the human brain; with which the brain of the horse corresponds very nearly.

The *cerebellum* (*b, fig.* 1, *pl.* III), or *little brain*, rests upon the tentorium or transverse septum of the dura mater; being placed superiorly and a little posteriorly to the cerebrum, with which it unites by its inferior part, its proportions being to it as 1 to 7: it is divided into four lobes; an inferior, two lateral, and a superior. It is, like the cerebrum, composed of two substances, but somewhat differently disposed; giving to a longitudinal section of it the appearance of a tree, the medullary white part branching out from a body called *arbor vitæ:* externally the cerebellum is formed into numerous sulci, but has no circumvolutions. The fourth ventricle, which in the horse is very considerable, is situated within this body, having its posterior surface upon the medulla oblongata, and its anterior being formed of the cerebellum.

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* The pendant position of the head of the horse necessarily makes some difference between the aspects of the human and brute brain: in the first, the cerebrum is the highest portion; in the horse, it is the lowest; but both retain the same relative situation. In the horse, the cerebellum approaches nearer to the foramen magnum, and the prolongation of the cerebrum passes under the cerebellum, to arrive at the same point (see *plate* III); which in the human is vertically opposed to the vertebral column, but in quadrupeds presents a posterior aspect.

The *medulla oblongata* (*a, b, c, fig.* 1, *pl.* III) is formed by the reciprocal continuation of the medullary substances of the cerebrum and cerebellum, by two portions from each, called its *crura:* proceeding upward and backward to the edge of the foramen magnum in the occipital bone, it takes the name of spinal marrow, and proceeds as will be shewn presently. The *bloodvessels* of the brain and medulla spinalis we have before described in the Angiology, where it will be found that both are supplied by the carotids partially, and by the vertebrals principally. The arterial trunks enter the skull in a very convoluted manner, and anastomose freely with each other, distributing their capillary branches within the substance of the cerebral mass. The blood is returned by the veins of the pia mater, which pour it, when collected, into the sinuses[*].

The *structure* of the brain (to be again touched on) is generally considered as fibrous; such organization being demonstrable in some of its parts. It is not in itself an organ of great sensibility; on the contrary, some portions of it, as the cerebrum, are nearly insensible: nor is the destruction of a small quantity of it necessarily fatal. Its diseases in the horse are principally confined to inflammation, which is either idiopathic, as in mad staggers; or symptomatic, as in the staggers of a distended stomach. Query, Is tetanus a morbid irritation of the brain, or of the spinal nerves[†]?

The Nerves.

The *nerves* are white fibrous cords, sent off either from the cranial or spinal brain, whose ramifications are distributed to all parts of the body, enveloped in a firm membranous neurilema, to give them density and consistence. Ten pairs of cerebral nerves pass out of the skull by appropriate openings in the cranial bones[‡]; and thirty-six spinal pairs are given off from the medulla spinalis by appropriate vertebral foraminæ. (See *Osteology.*)

[*] An inspection of the bloodvessels of an injected brain serves to exemplify the care that nature has taken, by tortuosity and almost endless communication, to prevent the effects of too rapid a circulation of the great quantity of blood sent to it; by which, as well as by the great length of the carotids, congestion of this organ is completely counteracted. Equally careful to provide against any want of its vital supplies, it is furnished with two sets of arteries; the principal of which pass up encased, as it were, by the cervical vertebræ, and hence called vertebrals. The returning vessels are also formed to favour the exit of the blood from the head; for here the veins have no valves, nor do they accompany the arteries; but are distinct and triangular, being formed of the strong firm coat of the dura mater; and to further this end they inosculate freely with each other; and also present, like the arteries, two trunks to each side, one of which (the vertebral) is effectually guarded from pressure by its situation; and in the other (the jugular), enlargements or sacs are found in many parts of it, particularly about the jaws (see *Anatomy of the Head*), purposely to obviate the effects of accidental interruption.

[†] In No. 30 of the *Hippiatrist*, is an account of a young horse destroyed by the presence of a grub, resembling that within nuts, but more transparent, which had insinuated itself into the substance of the cerebellum. We are informed by M. Desmaret also, that it is not very uncommon to find the *filaria papillosa* within the serous cavities of the brain of the horse. Sheep we know to be extremely liable to hydatids within its cavities, and on its surfaces.

[‡] Girard pursues a different division of the cerebral nerves, which he describes a

The *cerebral nerves* (*nerfs encèphaliques*, Girard).—The *first pair* or *olfactory* nerves (*n. ethmoidal*, G.) are very large and hollow, communicating by their cavities with the lateral ventricles of the brain*, in which they exhibit a great speciality from the human olfactory nerves. They appear to be formed of both the cortical and medullary portions of the brain, and take their origin from the anterior and inferior parts of the viscus, to be passed out of the cranium by the foraminæ in the cribriform portion of the ethmoid bone; after which they divide into numerous filamentary twigs, which traversing the ethmoidal holes, are finally ramified in a reticular manner over the surface of the pituitary membrane, by which its exquisite sensibility of smell is furnished.

The *second pair*, or *optic* (*n. oculaire*, G.), arise in firm cords behind the former, from two eminences proper to them, called *thalami nervorum opticorum*. In their progress forwards they unite near the pituitary gland, where again separating, they leave the skull by their proper holes in the sphenoid bone, each being enclosed in a sheath furnished by the dura mater; proceeding in company with the ocular artery to enter the orbit, when, penetrating the globe of the eye, it is expanded into the fine lamen called retina. (See *Anatomy of the Eye*.)

The *third pair*, or *motores oculorum*, (*n. oculo musculaire commun.* G.) are small branches which arise filamentary from the crura cerebri: they accompany a branch of the fifth pair out of the skull, by the foramen lacerum into the orbit, dividing into two branches, both of which are distributed to the muscles of the eye.

The *pathetici*, or *fourth pair*, (*n. ocul. mus. interne*, G.) are likewise small nerves which take their origin from the cerebellum, near its junction with the cerebrum: they also accompany a branch of the fifth pair, and are principally spent in the oblique muscles of the eye.

The *trigemini*, or *fifth pair*, (*n. trifacial*, G.) are large and very important nerves, having extensive communications, and consequently occasioning very diversified operations†. They escape by numerous filamentary

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twelve instead of ten pai[illegible] His eighth pair (*ou nerf labyrinthique*) is very small, and is spent on the labyrinth of the ear. His ninth pair is not the lingual, but the glosso-pharyngeus, usually described with the par vagum (which see). His tenth pair (*pneumo gastrique*) is the par vagum or eighth of our list, and of Mr. Percivall's also. His eleventh pair (*trachilo-dorsal*) is the *accessory* to the eighth pair. The lingual (*hyo-glossien*) forms his twelfth pair.

* In former days, when anatomy was principally studied from the bodies of brutes, this speciality led to a supposition that the olfactory nerves, being hollow, were intended as emunctories of the brain, by which the superfluous moisture passed off through the ethmoidal holes into the nose; and which gave rise to sternutatories or sneezing powders to clear the brain of man, in whom no such communication exists.

† 'Mr. Bell has shewn, that the spinal nerves, the suboccipital, and the fifth, have several essential circumstances in common: that they have each two distinct roots; that they have each a ganglion on one of their roots; that they are all distributed to the muscular frame, for locomotion and action; that each nerve is distributed to its corresponding division of the bodily frame, without ever taking a longitudinal course on the body; and, finally, that these nerves are common to all animals which have a symmetrical body and a regular nervous system. When we examine the origin of the nerves minutely, we shall find that the fifth is the only nerve of the skull which comes off in such critical circumstances as to have a root from the crus cerebri, and another from the crus cerebelli; which parts may, by comparative anatomy, be proved to be the continuations of the anterior and posterior divisions of the spinal marrow. The fifth will also be found to be the only nerve within the skull which has a ganglion at its roots. Those who have dissected the deep nerves of the head, or who have attempted to demonstrate the branches of the fifth pair to students, will be able to estimate the value of this view. I have examined

twigs from the crura cerebelli in one large cord, which speedily separates, and each nerve of the pair then forms three principal branches. First, the *ophthalmic (orbito frontale*, G.), which passing through the foramen lacerum, divides into the *supra-orbitar;* the *lachrymal;* and a nasal branch *(palpebro-nasal*, G.); whose destinations we need not follow, seeing their names already signify them. The second, or *anterior maxillary* branch, *(sumaxillaire*, G.) which is larger than the last, escapes by an opening in the sphenoid bone, and proceeds outwards by the infra-orbitar foramen, where it gives off (after the manner of radii from a centre) the facial branches *(pes anserinus)*, first parting with a twig to the inner canthus of the eye, another along the tuberosity of the upper jaw bone, and two or three more which ramify within the palate, posterior parts of the mouth, and among the upper teeth.—The *facial nerves*, communicating with the portio dura, descend in a straight course upon the side of the face, and divide into small branches, to be distributed to the upper or anterior lip; to the nares, and to the labial muscles.—The third original division of the trigemini or fifth, is the *posterior maxillary* nerve *(branche maxillaire*, G.), which is still more considerable than the former. It emerges from the skull at the base of the petrous portion of the temporal bone, and runs, defended by the ramus of the under jaw, across the pterygoideus muscle, to reach the anterior maxillary canal, where it furnishes the dental and medullary branches necessary for the teeth and bone. Before its entrance, it had given a buccal, a pterygoidean, a gustatory, and numerous other twigs, to the tongue and throat, as well as dental and medullary rami to the posterior jaw. It also again emerges from the foramen, at the symphysis of the jaw, to be distributed to the muscles of the lower lips and parts adjacent.

The *sixth*, or *abducent pair (n. oculo-musculaire externe*, G.) arises filamentary from the base of the annular processes, passes with the fifth pair, and enters the orbits to be given to the abductor muscles of the eye.

The *seventh pair*, or *auditory* nerves, *(n. facial*, G.) arise from the lateral superior part of the medulla oblongata, each dividing into two portions: that called the *portio mollis* enters the auditory foramen in a soft pulpy form, and is distributed to the internal ear. T[illegible] *portio dura*, named by Mr. Bell the *respiratory nerve of the face*, passes through the foramen auditorium, inclosed in the same investiture of the dura mater with the portio mollis; in its course it detaches a considerable ramus, the corda tympani: leaving the internal ear by the spiral canal in a firm cord, it parts with branches to the inner and outer parts of the ear: the main trunk then having first furnished the parotid gland, into which it dips, and, being enlarged by uniting with a branch from the maxillary, it now passes over the posterior jaw, contiguous to the temporal artery, and divides, its branches diverging like the sticks of a fan, some of which are distributed to the muscles of the anterior jaw, but the principal are given to the posterior, and unite with the anteriory maxillary.

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the nerve repeatedly, in its whole course, in *man*, in the *horse*, the *ass*, the *calf*, and the *dog*. By these dissections it is shewn, that the fifth pair resembles the spinal nerves in every respect, even in the peculiar form of its ganglion and plexus. In the *horse*, there is as distinct a plexus formed by the branches which go from the axilla or loins to supply the limbs. The form of the part from which this nerve arises appears also analogous to that of the spinal marrow, where the axillary nerves take their origin. If this be correct, it will be another proof of the similarity of the fifth nerve to the spinal nerves.'—*Shaw's Manual of Anatomy*.

The *par vagas*, or *eighth pair (pneumo-gastrique*, G.), arises from near the base of the corpora olivaria, at the extremity of the medulla oblongata, in disgregated fibres, in connexion with another pair of similar origin, named the *glosso-pharyngeus*, which forms the ninth pair of Girard: these are joined by a third from without the skull, called *spinal accessory*, to be hereafter described. These three trunks, united in one sheath, descend through the foramen lacerum of the base of the skull, when each parting from its fellow par vagum, passes on the side of the throat to distribute branches to the pharynx and base of the tongue. The par vagum thus freed, joins the carotid artery*, and enters the chest; the right and left differing somewhat from each other in course, but both eventually join the œsophagus, and accompany it to the diaphragm†. Having entered the abdomen, they reach the stomach; the left, to furnish the upper portion and lesser curvature, and giving also a branch to the great semilunar ganglion; the right, communicating with the left by its ramifications, is principally spent on the under portion and larger curvature, uniting with the hepatic and other abdominal neighbouring plexi‡.

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* In the course of its passage through the neck, the par vagum furnishes a filamentary union with the superior cervical ganglion; a branch which ramifies in the pharynx, a smaller to the œsophagus, and one of communication with the sympathetic; two nervous twigs ramify around the carotid, and a laryngeal branch runs to the larynx. As the œsophageal plexus is very conspicuous in man and the ruminants, it is reasonable to suppose that it is placed there to combine, in a peculiar manner, the action of the pharynx and stomach. And, on the other hand, may not its diminutive size in the horse and ass, in some measure, influence his inaptitude to vomit?—See *Dissection of a Camel, Journal of Science*, 1822.

† Within the chest each par vagum gives twigs to the tracheal plexus, which consists of communicating trunks from several sources, but principally from the great sympathetic: others are given to the cardiac plexus; and a single branch of some interest and importance, called the recurrent nerve, here separates from it; other filamentary rami follow to join the anterior and posterior pulmonary plexi. The right par vagum in particular, according to Mr. Percivall, furnishes in this course a considerable cardiac branch, which is distributed over the base of the heart within the auricles.

The *recurrent* nerve (*nerf trachéal récurrent*, G.) originates, one on each side, from the par vagum, near the anterior aorta, and passes up the neck along the trachea, at first towards its under side, but afterwards to the upper, from the outer side of the par vagum: it gradually approaches the inner side, and proceeds, as Mr. Percivall expresses it, 'along the anterior half of the neck, between the carotid artery and the trachea, where it ramifies in the muscles of the larynx and on the glottis; but has filamentary communication with the pulmonary and cardiac plexi, with the posterior cervical ganglion, and gives rami in its cervical passage to the trachea and œsophagus.' These nerves are supposed to be the medium of furnishing vocal energy, inasmuch as a division of them effectually silences an animal, which practice is on some occasions convenient; and by the description now offered, either or both may readily be detected, bearing in mind that along the anterior half of the neck it will be found near the par vagum (from which it may be readily distinguished by its being much the least trunk) and between the carotid artery and trachea. The course of this nerve in dogs is nearly the same also, in which animals the division of it is the most likely to be required.

‡ The par vagas are so important to the economy of the horse, that a division of them instantly kills; at the same time the division of one occasions little inconvenience; and even the loss of both in many animals, as the dog, &c., is not followed by immediate death. The par vagas have been supposed to be the principal agents in the secreting powers of the stomach; but as many animals in whom the digestive process is strong are denied them, this has been questioned. That they are very intimately concerned in all the functions of the stomach, we may suppose from the facts proved by experiment on animals easily vomited by emetic matters, in whom vomition is readily repressed by pressure on the brain at the origin of these nerves; but their principal importance is derived from their immediate and numerous connexions, as with most of the cerebrine nerves, and with almost the whole of the spinal ones also; by which extensive communication some of the most curious phenomena which occur both in health and disease are operated, and be-

The *spinal accessory nerves* derive their origin from filaments given off by the fourth and fifth spinal nerves, and sometimes from the third and the sixth also. As they enter the skull, they join the eighth; when emerging from thence, each ramifies within the muscles around, first communicating extensively with the neighbouring nerves and ganglia. This forms *the superior exter-respiratory of Bell.*

The *ninth* or *lingual pair* takes its origin from the corpus olivaria, and both pass through the condoloid foramen downwards along the branch of the posterior jaw to gain the root of the tongue, and seem thus to be peculiarly appropriate to its locomotion, as the gustatory are to its functional property of taste.

The *tenth pair*, or *suboccipitals (la première paire trachélienne*, G.), are sometimes considered as a pair of the spinal nerves; at others we find them described as the tenth pair of the cerebrine*. They arise in part from the extremity of the medulla oblongata, and, passing out by the occipital holes, are distributed to the muscles of the head and neck; and in part they also arise from the medulla spinalis. Each takes its course outwards by a foramen of the atlas, separating into an upper and lower division. The upper ramifies into the muscles in its vicinity, giving a small branch over the vertex to the ear and parts around. The inferior division, piercing a foramen in the anterior wing of the atlas, gains the trachea, ramifies around its upper portion, the thyroid gland and the muscles beneath; communicating with the cervical ganglions, and very generally with the minute branches of the neighbouring nerves, forming itself an important sympathetic medium.

The Spinal Nerves.

The *spinal marrow*† (*medulla spinalis*) gives off thé spinal nerves as it passes through the bodies of the vertebræ by an appropriate opening formed

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come understood by us. By these means, the larynx, pharynx, lungs, heart, and stomach, are united in one common sympathy and consentaneous action. In their connexion with the larynx and the pulmonic plexus, we readily perceive why pinching the trachea, in '*trying the wind*,' produces a convulsive action of the respiratory organs in the form of cough: it is thus also that the apparent anomaly of coughing, as a symptom of worms, is explained; by considering that a disturbance of the alimentary canal operates on the ærial passages by means of the extensive communications of the par vagas with the pulmonic plexi. By its connexion with the thoracic plexi generally, it arises that nauseating the stomach lessens the action of the heart and arteries. Through the connexions of the par vagum with the spinal nerves, by which latter the skin is furnished, a very marked sympathy is observed between the stomach and the integumental covering of the horse; and the veterinary practitioner, by this consideration, will readily learn why hide-bound accompanies worms and indigestion, as well as chronic affections of the alimentary canal in general; and also why lampas, which is only a tumefaction of the cuticular lining of the mouth, should be more a symptom of deranged stomach than an original local infection. Under this view, also, it is not difficult to understand why broken-winded horses feel the morbid sympathy of wishing to fill their stomachs with water; or why the drinking of cold water produces cough in many horses with tender lungs.

* Girard, it is seen, places them with the spinal. Mr. Percivall acknowledges ten *cerebrine* pairs, yet places the tenth with the spinal. In fact, however, this nerve may actually, like the bat, take either side, for it receives its roots from both within and without the skull; and Mr. Percivall's accurate dissections, particularly of the nerves, would have given weight to his decision on whichever side he had placed the pair.

† The spinal cord is covered by continuations of the membranes of the brain, and, like that, is composed of two substances, an ashy and a white: it may, therefore, be considered as a spinal prolongation of that viscus itself, rendered somewhat firmer by its investments. By its passage within the vertebral canal, it is completely protected from injury, being, like the cephalic portion of the nervous system, altogether encased by bone.

by the articulation of each of these bones with the other (*see Skel.*); consequently the names and number of these pairs of spinal nerves correspond with the vertebræ themselves. Hence there are *seven cervical, eighteen dorsal, six lumbar*, and *five sacral nerves.* Each spinal nerve in the horse, as in man, owns a double origin by filamentary bundles from the upper and under divisions of the spinal cord. The fasciculus of the upper origin (describing one side only), as soon as collected together, again disperses into a ganglionic enlargement; from the other end of which proceeds a nerve, which seems principally designed to act as *a nerve of sensation.* From the lower division passes a lesser cord, but which does not, like the upper, become immediately ganglionic; on the contrary, the integrity of its original structure is preserved, and throughout its ramifications it appears to prove itself a *nerve of motion*, as the upper is one of sensation. Having passed the ganglion, both unite into one rope within a common covering; yet are preserved distinct by an individual one also, by which neither their substance nor functions are blended*.

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* Our physiological views have been greatly extended by the discoveries made relative to this nervous rope. Mr. Sewell's attention was early drawn to a medullary hollow, which, originating within a sulcus of the brain (calamus scriptorius), was carried throughout the whole extent of the cord. This discovery made on the horse was found to exist also in the human *fœtus* and in the *adult* of all the higher orders of mammalia. Farther investigation has extended this most interesting fact, by the dissections, human and comparative, of Bell, Bellingeri, Mayo, Majendie, Desmoulines, &c. &c.: and in addition to this median furrow, it is now incontestibly proved that the spinal cord is divided into two semicylindric portions, a right and a left; also that each of them present three distinct columns, which corresponding, according to the demonstrations of Mr. H. Mayo, in dimension and directions to the corpora pyramidalia, corpora olivaria, and corpora restiformia of their own sides, respectively, are therefore reputed as direct continuations of these cerebral portions. Agreeably to this view, 'the *corpus pyramidale* of the right half of the spinal marrow occupies its anterior and inner edge from the *tuber annulare* to the lower termination of the spinal cord; and, by hardening this organ previously in alcohol, it may be easily detached from the rest of the column, without apparent laceration: the furrow which separates it becomes visible indeed to the naked eye. *From this column, at different points of altitude, come off all the nerves destined to voluntary motion.* Secondly, the *corpora olivaria*, situated immediately behind the pyramidal bodies, and occupying the lateral aspect of the *medulla oblongata*, are in like manner continued along the spinal cord downwards to its extremity, touching and parallel with the pyramidal column, and consisting, like it, of a bundle of parallel fibres. The slits disjoining it from the posterior and anterior columns are, according to Mr. Mayo, distinctly visible. This centro-lateral column gives off nerves at different points of its altitude, certain anomalous nerves, which Mr. C. Bell has reduced into one class, and named *respiratory.* The phrenic, the external respiratory, the accessory nerves of Willis, and the nervous vagas of the eighth pair, are the chief constituents of this class. Lastly, at the *posterior* and *interior* edge of the half cord is found another and similar oblong body, which anatomists name *corpus restiforme*, from its resemblance to a rope. This body is likewise found to extend itself downwards into the spinal cord, forming a posterior column, the last of the three into which each semicylinder or half-cord is divided. From this, the restiform column, *nerves subservient to sense only* originate at different parts of its height. The following, then, is the sum of the "*natural*" theory:—"From the anterior aspect of the spinal marrow, on each side, proceed nerves of motion; from the posterior aspect corresponding, arise nerves of sense merely; and from the middle or lateral column, between these, and which coincides with the transverse diameter of the horizontal section of the cord, spring nerves of a peculiar function, and named, by Mr. Bell, the respiratory system of nerves." The nerves of sense are larger than those of motion, and form a ganglionic enlargement a little before the point of union. Thus, common nerves are seen to spring from two roots, namely, from a large and knotted posterior root, and a small and uniform anterior root, soon joining itself with the former. Hence is at once understood why some injuries of the spine produce loss of sense; others, loss of motion only; and a third class, generally more severe, induces both species of privation. "I struck a rabbit behind the ear," says Mr. C. Bell, "so as to deprive it of sensibility by the concussion, and then exposed the spinal

The *cervical nerves* are seven pairs*, the upper bundle of each of which may be considered as principally distributed to the muscles of the upper surface of the neck; while the lower not only furnishes the muscles below, but sends off branches of extensive communication, as well as assistant branches for the formation of original and important nerves.

The *phrenic nerve* is the *internal respiratory nerve* of Mr. Bell, and, until his discoveries, was considered as the only respiratory nervous branch. Each phrenic is formed of filaments from the fourth and fifth, but principally from the sixth and seventh cervicals, and general ganglionic twigs of communication from the sympathetic, &c. &c.: passing along the neck, it enters the chest near the axillary artery; when, having gained the tendinous portion of the diaphragm, it is spread within the whole substance of that organ.

The *eighteen dorsal pairs* are given off by the notches at the extremity of each dorsal vertebra, in the manner of the cervical pairs, but are less considerable. The upper portion of each runs upwards between the transverse processes, and furnishes the dorsal muscles and the integuments of the dorsal region. The under bundles proceed in the grooves formed in the hinder edge of the ribs, in company with the intercostal bloodvessels; and themselves take the name of the *intercostal nerves*†.

The *lumbar nerves* are given off in the same manner as the former; their superior divisions being small, enter the muscles of the loins: the inferior division communicates extensively with the intercostals and the sympathetic, by

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marrow. On irritating the *posterior* roots of the nerve, I could perceive no motion consequent on any part of the muscular frame; but, on irritating the anterior roots of the nerve, at each touch of the forceps there was a corresponding motion of the muscles to which the nerve was distributed. These experiments satisfied me that the different roots and different columns from whence those roots arose were devoted to distinct offices, and that the notions drawn from the anatomy were correct." '—*Notes to Dr. Milligan's Trans. of Majendie's Physiology*, p. 584.

* The upper bundle of the first cervical nerve (*la deuxième paire, ou le nerf sous-atloïdien* of Girard) is principally distributed to the complexus or largest muscle of the neck, but gives a branch of communication with the second cervical, and also assists in the formation of a deep-seated cervical plexus. The under bundle furnishes a branch which mounts toward the poll of the neck and ears; one of communication with the cervical plexus; a superficial cutaneous; one to the larynx; and other lesser ramifications. The second cervical (for I shall now continue to speak of one only) furnishes extensive ramifications: its upper bundle, to the muscles around, to communicate with the first and third pair; its lower bundle, to join the spinal accessory, to the next nerve, and to the levator humeri. The third cervical follows much the same distribution as the last. The fourth does the same: from its inferior fasciculus a branch is given off to assist in the formation of the phrenic nerve. The fifth, by its upper filaments, supplies the deeper-seated muscles; its under gives also a phrenic branch; one to the levator humeri, serratus magnus, and one to the cervical or humeral plexus. The sixth furnishes important and large nerves: its upper bundles ramify in the muscles around; its lower are distributed to the longus colli, to the cervical ganglion, to the humeral plexus, and to the phrenic. The seventh, by its inferior filaments, furnishes a branch to the humeral plexus, communicates with the first dorsal, and by another considerable ramus with the sympathetic: its upper bundle is principally spent on the serratus magnus and neighbouring muscles.

† The first intercostal is large, as it principally forms the axillary or humeral plexus; its intercostal portion is small, and, unlike the others, it proceeds directly between the first and second ribs: it differs, also, in giving off no cutaneous branches (*ne fournit nulle division cutanée*, Girard). The second gives also an axillary branch and a subcutaneous one. The third, fourth, fifth, sixth, and seventh, each furnish a cutaneous nerve, and also supply muscles of the costal and sternal regions. The eleven succeeding intercostal nerves spread themselves over the asternal region and the abdominal parietes. The eighteenth directs itself towards the flank, and ramifies within the oblique and transverse muscles.

which the muscles and viscera around are furnished. The first sends branches to the muscles of the back, to the abdominal, to the psoæ, and to the iliac muscles. The second gives rami to the psoæ, and a spermatic branch through the abdominal ring. The third, fourth, fifth, and sixth, unite to form, in common with a branch of the intercostal, the *crural nerve*, which escapes out of the abdomen with the vessels, below the crural arch. The *gluteal* nerve accompanies the gluteal artery, and is ramified throughout the gluteal muscles.

The *crural nerve* gives branches in its passage to the inguinal glands, the adductors of the femur, and, passing downwards, is principally distributed to the muscles, and parts in front of the thigh: a twig is, however, sent down superficially on the inner side of the leg.—The *sacral nerves* are in pairs, and correspond with the number of the pieces of the false vertebræ of which the sacrum is composed, emerging from the holes in its sides. Their communications with the sympathetic are considerable; the first three or four pairs assisting to form the sciatic nerve on each side, but particularly the first. The remainder, as well as some filaments of the former, are distributed to the rectum, anus, bladder, and parts of generation in either sex. The penis is furnished by a considerable branch from them, in common with one arising from the hypogastric plexus.

The *sciatic nerve* is formed from branches derived from the last lumbar, and the first three or four sacral pairs, united into a very considerable trunk, which is found passing along the internal part of the ilium, and between the two layers of the sacro-sciatic ligament. Within the pelvis it gives off some rami; and as it passes out, it likewise furnishes others to the muscles of the thigh and scrotum: after gaining the posterior part of the thigh, it divides into two or three considerable branches, called the *popliteal*, again to be referred to.

The *coccygeal nerves*, Girard says, are usually four to each side, and differ from the other spinal nerves in being unconnected with the sympathetic, as well as in forming no plexi; and in being wholly distributed to the parts they emanate from, the tail.

The Nerves of the Fore Extremities.

I have already had occasion to advert to the axillary plexus (the plexus brachial of Girard, and the humeral of Mr. Percivall), from which source the fore extremity is furnished. This plexus formed from the fifth, sixth, and seventh cervicals, and the first and second dorsals, divides into six or seven trunks. The external thoracic (*thoraco-musculaires*, G.) are several branches given to the muscles connecting the limb with the body, and which extend themselves to the fleshy pannicle also. The scapular are also parts of this division, whose name denotes their destination. The *spiral nerve* of Mr. Percivall (the posterior humeral of Girard, and the *external humeral* of the last edition of the VETERINARY OUTLINES) is a very large branch of these, derived from the axillary or humeral plexus, which first accompanies the axillary artery, then winds round the head of the humerus, gains the radius, furnishing in its course muscular energy to this important portion of the fore limb, and is finally ramified in this vicinity.

The *radial nerve* (*fig.* 2, *plate* VII) is formed from one of the last of the axillary branches, which, in the last edition, was properly called the internal humeral (*cubito-cutané*, G.) It descends along the back of the fore arm, and, in company with the bloodvessels, is found under the annular ligaments behind the knee. It now takes the name of internal metacarpal, having given numerous ramifications in its course, both muscular and cutaneous.

The *ulnar nerve (cubital interne*, G.) is the last branch of the humeral plexus; in its passage it gains the olecranon, and, running in the direction of the humerus, it reaches the bend of the knee under the annular ligament: passing along the inner edge of the trapezium, it becomes contiguous with the tendo perforans, when it takes the name of the external metacarpal, in which course it gives off several muscular and cutaneous rami.

The *internal and external metacarpal nerves*, formed as already described, having gained the fetlock joint, become the pastern, plantar, or lateral nerves *(n. plantaire*, G.) The branches given off by the metacarpals in their course are slender twigs given to the tendons, ligaments, and skin; particularly one of communication from the internal to the external is met with about the centre of the shank; and another immediately above the fetlock, of considerable magnitude and importance, is distributed over the fetlock and fronts of the pasterns, ramifying over the coronets.

The *plantar nerves*, *(n. lateraux*, G.) situated to the rear of the plantar arteries, penetrate to the back of the foot: each in its passage detaches a branch immediately to the lateral cartilages, a more posterior branch to the fatty frog, and one to furnish the laminæ. The main trunk then penetrates the coffin bone posteriorly with the principal division of the plantar artery, to be, like that, distributed over the coffin surfaces.

The Nerves of the Hinder Extremities.

We have seen that the muscles of the haunch, and those of the true thigh, are furnished with nervous branches from the crural, obturator, and gluteal nerves. The sciatic nerve divides, as already pointed out, into the *popliteal* branches, which, according to Mr. Percivall, are usually three, and thus distributed:—the first and principal one, passing between the fleshy portions of the gastrocnemii, gains the hock *(vide k, fig.* 1, *plate* VIII), where separating, it forms the metatarsal nerves. The second, which is much smaller, accompanies the first for a short distance, and is then ramified into the flexor muscles and parts around the stifle. The third proceeds towards the outer face of the thigh, when, having reached the anterior tibial artery, it travels with it to the middle of the cannon; when leaving it, and passing over the fetlock joint, it spends itself on the pastern surface. In the early part of its course it gives branches to the gastrocnemii and other muscles of the thigh, leg, and foot.

The *internal and external metatarsal nerves* pursue a course so similar in the hind to those of the fore extremities, that it is unnecessary for me to proceed with them further.

The *diseases of the nervous system* at large are less numerous in the horse than in man; and, as might be supposed, those of the brute are more observed in the nervous masses, where the development is so much greater in proportion to the brain; while in man, whose brain preponderates over the nervous tissues, cerebral diseases prevail more. Such as are common to the brain of the horse have already been enumerated. The *diseases of the nerves* are principally such as are dependent either on a morbid excitement of the irritability natural to them; or otherwise of such as are brought on by any cause which obstructs or lessens the sources of this excitability, as pressure, lesion, &c. Convulsions and spasm are consequences of morbid excitements of the nervous system. Tetanus is the most prominent instance we have of this; and which, as it has been partially and momentarily relieved by pressure on the brain, might be supposed to originate in that organ; but our knowledge of the connexion and dependencies of the cerebral with the spinal mass will not necessarily force us to this conclusion, although it is not impossible or even improbable. Spasmodic colic appears to be a morbid excitement of the nervous tissues spread over the intestines. Stringhalt is probably occasioned by local nervous irritation. The diseases consequent on an *interruption* to nervous excitement are more numerous; and in the horse seem to be connected more with the nervous part of the system than the cerebral. A disease termed *kumree*, common in India, appears to be produced by pressure on the spinal cord; and sanguineous congestions are now known to take place within the spinal canal in other cases, and produce partial or total paralysis more frequently than we heretofore supposed. Hydatids have been found there; and the general texture of the medulla spinalis has also become morbidly softened; as shewn by the post-mortem examination of palsied oxen, sheep, and dogs, as well as of horses. The spasmodic twitchings left in the limbs of dogs after the distemper are probably derived from some affection of the spinal nerves. The blindness of some horses appears to originate in paralysis of the optic nerves.

The Physiology of the Nervous System, as exhibited in its Structure, Sympathetic Connexion, and Functional Purposes.

The *structural peculiarities of the brain and nerves*, connected with their physiology, may be briefly stated thus: Modern physiologists are disposed now to consider the brain and nerves as one and the same organ. Of the ultimate composition of the brain, our researches teach us little more than that it presents two substances, a white and a brown, intermingled in various ways; and although the brownish-grey matter is called cortical, yet the relative situations of both are frequently reversed. In some parts the cortical is the invested portion; in others laminated strata of each alternate; and in some they traverse each other in nervous masses. The vascularity of each portion is probably the same; but in the white part the ultimate divisions of the bloodvessels are probably too minute to admit any but the colourless parts of the fluid. In the fœtal state of the horse, as well as in that of all mammalia which have been examined, the brain is developed after the other parts of the nervous system, and appear in the following order: first, the more important ganglia, the less complicated following; next, the spinal cord makes its appearance; and, lastly, the brain begins to assume form and consistence from a fluid speck. From this it has been argued, that it is incorrect to say that the nerves originate from the brain, but rather that the ganglionic and nervous cords are finally matured or developed in a cerebral mass. The horse possesses a brain constructed in all its parts much after the human cerebral type; the absence of a few eminences, in addition to the variations already pointed out, are all that mark the structural difference; the general volume of the encephalic mass, in relation to the animal bulk, is much less in the horse than in man.

The *structure of the nerves* is little better known than that of the brain; their fibrous composition is, however, more distinct, and their delicate texture is maintained entire by means of a membranous envelope, termed neurilema. Whether this be a continuation of the cerebral coverings throughout we are not aware; but the dura and pia materal tissues can be distinctly traced over a part of their course: what structural peculiarities mark their ultimate divisions we know not; they have been supposed solid fibrillæ, and they have been asserted to be hollow canals, conveying a nervous fluid of extreme subtilty. We regard each nerve as presenting two extremities, one connected with the brain, the other terminating in the organs; and so vacillating have been our opinions, and so confused our notions regarding them, that these extremities have each, by turns, been called the *origin* or the *termination* of the nerves. These organs have no determinate figure; some are long, some short; some are round, while others are flat. Their organic life, like that of other parts, requires a supply of blood, and we see the vessels which carry the vital fluid ramifying on their surface; but their lightness of general hue shews that the red parts, at least, do not enter their substance. Like the important bloodvessels, their principal trunks pass to their destinations deeply seated, particularly in the extremities. In their passage they branch off at acute angles, and finally ramify by sentient extremities of such minuteness as to be invisible to the eye. Both the transit and the distribution of the nerves vary under different circumstances: sometimes they proceed to their destination in direct lines and in single trunks, as the optic and olfactory: more frequently, however, they communicate and interlace with each other; and, where such junctions are particularly close and numerous, they form a *plexus*, from which branches are again detached to different parts of the body. The nervous divisions also frequently unite to form a still more remarkable and important appendage to the system at large, called a ganglion.

A *ganglion* is a swelling of a nervous cord, of a greyish colour, varying much in figure and dimensions. In the larger ganglia, the fasciculi of nervous filaments are seen to be first separated and then re-combined; but beyond this our knowledge of their structure is suppository, neither are we better informed as to their functions. Ganglia are not common to all nerves: the *upper* branches of all the spinal, those of the eighth and the fifth pairs, are the most prominent instances of ganglionic connexion; and we become assured that a direct and specific purpose is assigned to these nervous knots, by the fact, that the *lower* branches of the spinal nerves are without them, as well as so many other important nervous trunks. And further, that as nerves of involuntary motion, and such as are particularly destined to general sensibility, are those which principally arise from ganglia; so we are led to conjecture that they are designed to place the nerves they belong to out of the controul of the will, as well as to furnish fresh relays of nervous energy, which it is remarkable become, by their means, probably, incapable of fatigue or exhaustion. Thus the horse of thirty continues to respire with equal ease as he did at five, unless his lungs have become disorganized; neither by any act of his will is he capable of stopping the respiratory inhalation. The nerves of sense are five or six times larger than nerves of motion, which was necessary, as well from the importance of their office, as that they receive in general no accession of vigour from ganglia. This difference between the two is well illustrated in the anatomy of the elephant, where the whole nervous branches given to the motive organs of his powerful trunk are less than that from which the tactile qualities of its small nipple-like extremity are derived.

In the general distribution of nerves, some parts are found to be much more plentifully supplied than others: the organs of sense, the muscles, and the skin, are peculiarly so. The living powers of the nerves to support themselves must be considerable, from the now fully established fact that they are capable of reproduction*. The simple division of a nerve destroys for a time only the nervous powers of the ramifying branches beyond its division; it being found that the divided extremities becoming enlarged, and more vascular, pour out adhesive matter, which soon becomes organized, and the subsequent cicatrization of which draws the divided ends nearer together, and the nervous as well as the living principle is continued through the interposed substance; which appears to assimilate nearly, but not entirely, to the structure of the original trunk. This is proved to be invariably the case in the nerves formed for sensation; but at present we are not aware that similar phenomena can be made to follow the division of the nerves of voluntary motion. (See *Neurotomy.*)

The *sympathetic connexions of the nervous system* are principally derived from a pair of nerves whose course extends from the brain to the termination of the sacrum. Treating of one only, this nerve has been called great intercostal, from its situation; but, as it neither originates within the area of the ribs, nor is confined in distribution to that vicinage, it is with more propriety named great sympathetic, from its surprising effects and extensive communications, which are such as to include not only all the most important sentient nerves of cerebral origin, but the thirty-six spinal pairs also.

The *great sympathetic nerve (nerf trisplanchnique*, G.) may be considered to arise within the skull, by filaments received from the fifth, sixth, eighth, ninth, and tenth cerebral nerves; but it appears to receive its largest branch from the fifth; next from the united nerves of the eighth; next, from the tenth; and subordinately from the sixth, ninth spinal accessory, and first spinal, as it enlarges without the skull, into the *anterior cervical ganglion*, found at the base of the cranium in front of the atlas. This important ganglion, formed by these numerous assistants, again determines itself into a renewed sympathetic trunk, which commences a new march of intercommunication, directing its course between the carotid and par vagum, to which latter it is contiguous, to the bottom of the neck, where it again enlarges into the *posterior cervical ganglion*, which is situated under the first dorsal vertebra, from which nervous twigs of communication with the par vagum, recurrent, and the remaining cervical, as well as some of the dorsal nerves, are given off; by the union of which, the important tracheal and cardiac plexi are formed, whose branches are distributed to the important viscera of the chest, respiratory and circulatory. Proceeding under the articulations of the ribs with the spine, at length it divides into three portions, the two splanchnic nerves, and the remainder of its original trunk; all which penetrate the abdomen, and principally expand their trunks in forming, together with the par vagas, the *great semilunar ganglion*, whose nervous radii, sent off, constitute the *solar plexus*. From the solar plexus numerous minor plexi are formed, each of which, furnishing an individual important abdominal viscus, receives a corresponding name, as the splenic, hepatic, mesenterica, aortic, hypogastric, and renal. Having gained the pelvis, the sympathetic, in conjunction with the lumbar nerves and its fellow sympathetic, forms numerous minute ganglia, from which the pelvic viscera are furnished: and thus terminates this extraordinary medium of communication between all the important parts by which they are united in one common sympathy of action; from whence arise many curious phenomena, both in health and disease, but which are infinitely more diversified in the human than the horse; where, however, the effects are yet sufficiently interesting, and practically important.

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* It is but due to departed genius to promulgate, that this important fact, if it did not immediately originate with the late ingenious Dr. Haighton, yet was first established by him in 1792, at which time I assisted him in numerous experiments on the reproductive power of the nervous structure in their divided trunks. The result of which, illustrated by drawings which I made from the parts in the various stages of their re-union, were presented to the Royal Society the following year, and gained for this excellent physiologist their gold medal.

The *physiology of the brain and nerves*, important as it is, is yet involved in an impenetrable mystery. We however know enough to be assured that the brain is the organ of consciousness; and that in proportion to cerebral development, are the number and kind of intellectual phenomena displayed in different animals[*]. The nerves appear to be the media or messengers by which nervous influence, in the phenomena of sensation and volition, are transmitted to all parts of the body, and by them excitements to motions are propagated[†]. The nerves also convey impressions back again to the brain; thus the horse smells with his nose, and feels with his lips; and through the medium of the nerves of both, his intellectual powers, resident in the brain, take cognizance of the matters examined. To the organs of voluntary motion, the excitement along the nerves is dependent on the will; to the involuntary, it is dependent on necessity or sympathy, connected with the wants of the animal. If the brain be injured, locomotion is destroyed wholly or partially, in proportion to the degree of cerebral derangement. From some wise provisions, perhaps from a power resident within the ganglions *per se*, the functions of the involuntary motions go on when the voluntary are stopped; as we see in animals partially stunned, and in apoplexy, where breathing and even digestion are carried on while the limbs are motionless and the animal sleeps. Pressure on the brain produces the same phenomena as laceration of certain parts of it. Tænia in the head of sheep gradually destroys life by this means; and concussion, by lacerating the medullary fibres, produces similar symptoms, but more immediately. When the brain is diseased or compressed, the whole body suffers, and becomes convulsed or paralysed: but if the spinal marrow be thus circumstanced, then only those parts whose nerves are given off posteriorly to the seat of injury become affected. When the brain is compressed or injured on one side only, leaving the other wholly unaffected, it has usually been found that the morbid consequences appeared on the opposite side[‡]. On the contrary, when one column only of the spinal marrow is divided, the paralytic affection has appeared on the same side; but is still equally accounted for by a decussation of its medullary fibres, which decussating within the vertebral canal, restore the integrity of their course. The nerves are acted on by what we call *stimuli*, and which are of various kinds. Mental stimuli act on the brain of the horse as well as on that of man; and the phenomena produced, though not so numerous, are no less well marked. Who has not witnessed the effect of the voice of the hounds on a hunter? and who but has observed his extraordinary exertions when his nervous system has been thus excited? There is something also exhilarating in the effects of a clear frosty air on the æquine system, which produces a disposition to gambol and frolic. Full health and generous food are stimuli, natural and appropriate, and the nervous sensibilities are increased by them. The passions, generally, are also powerful excitements; fear will produce exertions extraordinary to witness. Some nerves are insensible but to an appropriate stimulus, as light stimulates the retina, but the finest sounds fail to move it; and thus, hearing is operated by the acoustic nerves only. These specific stimuli are totally independent of the ordinary one of sensation, by the intervention of nervous branches of sensation: thus the blind eye is sensible to heat, though dead to light; and we hence learn to admire that wisdom which has thus separated these ordinary from the extraordinary excitements.

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[*] As a general conclusion, we may assume that where the rational principle is strong, and the organs of sense are comparatively weak, as in man, the volume of brain does greatly preponderate to the general mass of nervous matter. On the contrary, in brutes, where the organs of sense are more depended on than the rational principles, the nerves form the greater proportion. In directing, therefore, our attention to the ratio which the volume of brain bears to the bulk of the nerves arising from it, it will be found invariable, as far as inquiries have been hitherto prosecuted, that in proportion as the cerebral or more noble part preponderates, the rational powers will be seen more extended and diversified: and by this mode of comparison, man is without any competitor. The simia, elephant, horse, dog, &c., follow, each presenting an exact proportion in the order of its intelligence, which confirms the justness of the principle. This superiority of mental power is not connected at all with the powers of life, but, on the contrary, seems to be set in opposition to them; for in man, and the higher orders of mammalia, the living principle is more easily destroyed than in the lower; and in every instance, except that of the monkey, in the proportion to the degree of intelligence possessed.

[†] There being nerves of *sensation* and others of *volition*, enables us to understand why a paralytic limb may retain its feeling, and *è contrario*; why also the horse may be deprived of sensation in a diseased foot by neurotomy, without losing his power over the motions of it: it is senseless, but not paralytic. Volition and sensation are then happily unconnected; and although the fact was not unknown to us before, much additional light has been thrown on it within the last twenty years.

[‡] Some interesting but inexplicable phenomena in the animal body have made it appear, that, in their cerebral origin, the nervous fibres decussate; in the optic nerves this structure is distinctly visible, and the uniformity of such phenomena has given weight to this belief. It is thus, also, that pressure or any morbid change of one side of the brain, although it deprive the other side of the body of motion, may yet leave its sensation unimpaired.

The nervous principle,—what is it? It has been supposed to be identified with *electricity* or *galvanism*, because these agents excite extraordinary convulsive motions in the body when applied to them: but it should be recollected that nervous energy ceases when a nerve is compressed or divided; while the galvanic influence will still retain its power over the nerves, provided the severed portions are brought into contact. If electricity, therefore, be identified with nervous principle, it may at least act without cerebral continuity: and we do, indeed, find that a cerebral power, or one similar to it, does actually reside in some of the nerves, the spinal for instance, independently of the cephalic portion of the system; and thus, though the nervous excitement is one *sui generis*, it may yet be a modified form of electricity; which, with the probable exceptions of caloric and attraction, appears to be the most universal principle in nature. The nervous excitation has been attributed by some to *oxygen;* by others to *hydrogen;* and by a third, to *azote;* but it cannot depend on either of these; for the first proves a morbid irritant to them, and the two latter suspend their action. To suppose the elementary nature of this exciting power consists in *oscillation* or *vibration* of the nerves as cords, is to resist numerous proofs to the contrary. The pulpy softness of their texture, their continuity with other masses, and their own laxity of situation, but, above all, our knowledge that a compressed nerve is inert, whereas a tense cord, although tied, oscillates, are, we think, of this kind. Many others believe in a *subtle nervous fluid*, which, passing within the hollowed trunks of the nerves, and exhaling through their terminal points, proves the medium of excitement. It is cited in proof of this circulating fluid, that the effects of tying prove that there is something corporeal in it, and that this matter is a secretion from the brain. It is, however, not necessary to sensation that either the nerve, or the part on which *the impression is represented in the sensorium*, should even be in existence. The limb left on the plains of Waterloo is felt most acutely by the old soldier to the ends of his fingers or toes. Here no fluid can circulate; nor can any *chord* ring a vibratory note in the ear of him who has lost it. Nervous power is something *sui generis*, and, at present, is completely beyond our comprehension.

Nervous sympathy presents also phenomena equally inexplicable, although here we have also tangible and solid objects, as well as marked operations, resulting from them. I have endeavoured, in a comprehensive manner, to trace the course of the *sympathetic nerve*, by which a kind of common consent is kept up in dissimilar and far distant parts. The debauchee finds a distressing head-ache relieved almost immediately by a dose of magnesia, or a glass of soda water, because the nerves of the head sympathised with those of the stomach. We need not, however, look for proofs of sympathy in man alone; for, by turning to our own subjects, we shall find them multiply on us. Who has not seen the slaver run from the mouth of the hungry dog in sight of the mixing of his daily mess? Here the salivary glands were in unison with the cravings of the stomach, and were already preparing the accustomed diluent of the food. The *horsing* mare has her stomach affected by the œstrum of her genitals; and she eats little, because of the communications between her pelvic and semilunar ganglia. The urinary organs can be brought by habit to sympathise with the ears; and hence the solicitation of whistling long applied, at last, by associating with it the ideas of rest and opportunity, will bring on staling in the horse almost at will. The philosopher may laugh at this, but the ploughboy and ostler acknowledge its power, and act on it to their own advantage and that of their horses: nor is there more reason to doubt that a horse may be influenced by hearing an accustomed whistle of solicitation, than that Sir Joshua Reynolds was unable to refrain from a similar evacuation whenever he heard the sound of a violin. Cows almost invariably both dung and water the moment they enter a pond: the sympathetic effect produced by cold partially applied to the extremities only, is marked: deluge them with rain, and no such effect is produced.

In disease, the sympathies are equally numerous and important: the devastating and painful effects of a quittor are acknowledged by the stomach, and food is refused. The skin sympathises with the convulsive action of the abdominal portions of the great sympathetic, and thus the griped horse becomes bathed in sweat. The action of the heart is quickened, and that of the lungs is also accelerated, from sympathising with an inflamed foot. Sympathy is a great and necessary sentinel, so that one part shall not be allowed to suffer without all the others being apprised of it; and a general call is then made on the *vis medicatrix naturæ.*

Some very important and ingenious experiments, lately made by Mr. Brodie, would seem to extend this sympathetic communication from the nervous to the sanguiferous system, in the production of animal heat; which has been long supposed to depend on the chemical change which the blood undergoes in the round of circulation, but which his experiments would tend to prove is effected by nervous influence. For Mr. B. invariably found, by destroying the communication between the brain and lungs, the heat of the body disappeared, although respiration was kept up by artificial means, and the other ordinary changes of the blood appeared the same. (See *Respiration.)* It remains only to add, that if I have extended this subject beyond the limits of even the last edition, where it had been also greatly enlarged on, it has been from a still stronger conviction than heretofore of its great importance to the medical student, both in a theoretical and practical point of view. To a more accurate knowledge of the structure, anatomical arrangement, and functions of the nerves, we are indebted for some of the greatest improvements the healing art in general has lately received, and in which the veterinary department acknowledges at least an equal share; of this, Neurotomy forms a prominent instance. My limits necessarily confine me in my anatomical detail. I have however introduced, I believe, all that is essentially connected with the practical deductions of the student. Brevity is forced on me; but a reference to the ingenious writers we have quoted, both English and foreign, will supply my insufficiencies; in particular, Mr. Percivall and M. Girard, as anatomical guides, may be studied with advantage. Mr. Percivall's dissections of the nerves are masterly performances, and, in many instances, are perhaps more correct, and certainly more explanatory, than those of his great assistant guide, Girard.

SECT. XIV.

ADENOLOGY.

GLANDS are vascular secretory bodies distributed over every part of the animal frame. They are of various sizes, some being very large, as the liver, and others small, as the cryptæ. Their *figure* is as varied, and their *situation* undetermined; some being deep-seated, or within cavities, while others are altogether superficial. The office of secretion does not appear proper to all those parts we consider glandular, as is instanced in the thyroid, which, as far as we know, does not secrete; other parts again secrete that appear to have no glandular structure, as the capsular ligaments. Glands may be divided into *folliculose, globate, glomerate,* and *conglomerate;* they likewise receive individual names, according to their office, as *lachrymal, salivary,* &c. The *follicular* are small glandular bodies variously disposed, and appear either *sebaceous* or *muciparous.* The *sebaceous* are mostly situated on or near the surface of the body, and produce a semi-solid substance resembling suet. *Muciparous glands* are small follicular bodies, usually situated in cavities and canals; secreting a mucus, as that of the nostrils, fauces, and urethra; but in many instances they are not very evident, and in some mucous membranes their existence even is doubtful. *Globate glands* are oval vascular bodies, receiving lymphatic vessels at one side, and permitting their exit at the other, but are destitute of any other excretory trunk; hence they are deemed peculiar to the lymphatic system. A *glomerate gland* appears one connected body, of an indefinite shape, with an excretory duct, as the kidney, liver, &c. A *conglomerate gland* is a body composed of several glomerate glands, or lobuli, each of which has its proper excretory duct, which unite to form one trunk common to the whole, whereby the gland is officially connected, but is structurally held together by the cellular membrane: instances occur in the parotid and pancreas. There does not seem to be any essential difference in the economy or functions of the glomerate or conglomerate glands; the convenience of situation appears to be studied more than any varieties in their office; hence, early in life, some are conglomerate which in the adult become glomerate. The glands of young subjects are said to be larger than those of older; and from the alteration which takes place in the kidney and thymus glands, we see that some change really does take place both in their size and figure during life. The nerves of glands are small, and thus their sensibility is not considerable. They have also absorbents, which in some instances, as those of the liver and spleen, are very large. Their bloodvessels, both arteries and veins, are usually large, particularly when the office of secretion is considerable, as in the kidneys. In its passage through glandular bodies, the blood is found to be retarded in its course by means of the structure and situation of these vessels: their arteries being usually convoluted, and having a greater proportion of muscular than elastic coat, while their veins are without valves; by which the blood is retarded within the gland, and can be more completely acted upon. All the secreting glands perform their office on the arterial blood, except the liver, which separates the bile from venous blood. Among the phenomena that these bodies present, a sympathetic property is a marked one. The sight of food stimulates the salivary glands, and which is particularly observable in the carnivora; thus a dog will slaver abundantly while his meat is cutting for him. The sympathy of the kidneys with the skin is very considerable, and, when either becomes greatly excited, the secretion of the other diminishes. In summer, when the skin is in full action, and the blood pours out its aqueous particles in sweat in great plenty, little urine is made; but in winter the reverse takes place. As the circulation through a gland is increased, so is the secretion enlarged likewise; hence under the first stages of inflammation glands secrete more, because the circulation is quickened; but in the latter stages of it, and when it becomes excessive, the secretion is lessened, or totally stopped, for then the gland probably becomes, in a measure, disorganized, and unfitted for its functions. The individual glands will be described with the parts to which they more immediately belong.

The *physiology of secretion* is but little known. That from one liquid (the blood) fluids so different as the urine, semen, bile, &c., should be formed, cannot fail to excite our wonder and stimulate our inquiries. Glandular secretion has been supposed to depend on the previous existence of the secreted matter within the blood, and that the glands only strained, or otherwise separated, these component particles. But the blood, it has been answered, possesses the same chemical properties throughout the body; and that, drawn from whatever secreting organ it may, it is still the same. Nevertheless, the elementary principles of all these may exist in the blood in a latent state; and it does appear to be a living act of the glands themselves to separate and compound each proper secretion from it: we can therefore arbitrarily alter many of the secretions both in quality and quantity by local excitements. This opinion is farther proved by some of the phenomena of vegetation. The sap of trees owns the same chemical properties, yet forms, by medium through which it passes, either wood, bark, leaves, blossoms, or fruits.

The *diseases* of the glands in the horse are fewer than those of the human glandular parts. Scrofulous and cancerous affections are nearly unknown in veterinary pathology. The glandular secretion can, however, become morbidly excited, not only as to quantity, but as to quality also; as we witness in diabetes. Urinary calculi arise from a deranged secretion also, or from morbid separation of earth mattery from the blood. The liver, the spleen, and the pancreas of the horse, have all of them been occasionally found diseased and much altered in structure.

SECT. XV.

SPLANCHNOLOGY.

HAVING treated of the structure and composition of the parts of the body generally, we come now to describe the organs themselves individually; which we shall do by considering the horse as composed of head, neck, chest, abdomen, pelvis, and extremities. All these parts are invested by some general coverings, which must be first noticed.

The common Coverings and Integuments.

Under the name of skin, are exterior parts kindly bestowed on animals to regulate their form, to protect them from injury, and to modify the action of the surrounding elements. These components are the cuticle, or insensible skin, the rete mucosum, and the cutis, corium, or sensible skin; and connected with these, are the adipose and cellular membranes, and the panniculus carnosus. The hair and hoofs are also considered as appendages to the skin; the former of which, as being most exterior and almost universal, we shall first notice; the latter will be described with the extremities.

The *hair*.—Each hair is a little tube, whose bulbous end arises within the cellular web immediately attached to the cutis, or true skin[*]: it penetrates that, the mucous web and the cuticle, and appears exteriorly of indeterminate lengths, figures[†], and sizes. Thus those of the mane and tail are large and long; those above the eyes and around the muzzle are strong, but of diminished length; while those which extend over the body generally are comparatively very short and fine. Each hairy tube is formed of an external horny covering, and a central vascular part, termed its medulla or pith. The horny portion is filamentous, and so disposed as to form each hair into an elongated cone with protruded processes, giving the hair the property of receding in the direction of its roots when subjected to pressure, and on which the process of *felting* depends. The colour of the hair varies much in different subjects, and in different parts of the same subject, and which variations appear in a considerable degree to depend on the colour of the mucous web, which is exemplified by spotted or piebald horses, in which the colour of the skin varies with that of the hair. As certain tints of hair are supposed to arise from certain general structural arrangements, so its colour has been regarded as a criterion of mental and personal qualities (see *Exterior Conformation*): and there appears to be reason for this supposition; for many facts prove to us that hair of a dark tint usually accompanies strength and durability[‡], as light hair usually indicates weakness and irritability. Age, which produces debility, is accompanied by a change in the colour of the hair, from a darker to a lighter tint; and the hair which arises after a wound is usually white, and this whether the mucous web has been destroyed or not; which cannot be accounted for but by considering the part to be in a state of debility. It is likewise remarked that white extremities are found more disposed to the affections of cracks, grease, &c. than others. The inclined position of the hair admirably adapts it to the purposes of protection for which it is designed[*]. This position sometimes becomes disturbed, partly by a derangement in the vascular bulb of the hair from whence the unctuous matter is derived, which tends to make the sleek glossy coat of the healthy horse so beautiful; and in a greater degree from a derangement in the skin itself, originating in a sympathetic communication between it and the alimentary canal (see *Hide-bound*, see also *Physiology of the Nerves*). In the cold fit of fever, or under the action of accidental cold, the coat will also stare by the corrugating influence of the panniculus carnosus. The hair is kindly allowed to sympathize with the wants of the body generally, and thus it is given thick and curled in cold countries, as is witnessed in the Shetland breeds. It also alters its quantity and quality, by this sympathy, to the varied temperature of climates alternately hot and cold. In the Orkneys, the horses retain their long hair all the year, and English horses taken there do the same. But with us, as that portion of the hair called the coat is deciduous, and falls off (that on the mane, tail, and fetlocks, is permanent), so the animal is seen to present the phenomena of a fine short coat in the spring, which has succeeded to the winter covering. As autumn approaches, this also falls, and gives place to a longer, thicker, and warmer expansion. That this is a sympathetic effect between the skin and constitution, is evident from what takes place in such horses as are very artificially treated, that is, by being constantly immured in hot stables: for in them, as the change of temperature between winter and summer is hardly perceptible, from the additional heat that is usually given the stables at this time, so, the constitution not wanting any increase to the covering, the summer coat either remains, or, if it be changed, it is for one with the same length of hair. Not only do hot stables tend to prevent a long coat from forming, and thus to perpetuate a short one, but most stimulating substances likewise have the same effect; from which it appears probable that any thing which increases the circulation has a similar tendency: hence likewise horses, after strong exercise, shed much hair, which is an act of the skin to prepare for a future production; and, aware of this, idle grooms give their horses spice and other stimulants to hasten the deciduous change. The general growth of hair appears a process that requires considerable powers of the constitution; thus horses at the time of moulting are usually weak, have an increase of pulse, dry mouth, and other slight febrile symptoms; which appearances are particularly observed in such horses as are very artificially

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[*] In some animals the hairs appear to be merely filamentous elongations of the cuticle, and are subjected to its various changes, as is seen in caterpillars, whose hairs are cast with their cuticle or outer skin.

[†] Some hairs are thickest in the middle, and in some animals they are seen flat; in the whiskers of the seal their margins are waved. In the porcupine and hedge-hog they become spines; in swine, bristles; and when crisped, they form wool: but in all, hair forms one of the most permanent animal substances with which we are acquainted, resisting putrefaction very long.

[‡] It is found that black hair is usually accompanied by a very thick skin, and it is remarkable that few thorough-bred horses are black. There is also a general connexion be-

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tween the colour of particular parts and that of the hair. The eyes, hair, and skin, are usually of the same tint: milk-white horses are thus often wall-eyed.

[*] Parts subjected to much disturbance by motion, as the bendings of the extremities, throat, flank, &c. have the hair irregularly placed and wavy, which prevents the effects of friction; we thus apply the crisped fleece of the sheep, in the undressed skin, as a guard against galling, to our collars and cruppers. The hair is also equally irregular in its distribution, being on the exposed portions of the body very dense, but under the belly, the entrance to cavities, and around the lips, nose, &c., very soft and fine. A singular variety of African horse is entirely without hair: Mr. Sewell saw a stuffed preparation of such a one at Berlin.

treated*. As the hair appears to be a production of the true skin and the cellular web, so, if by any means these become wholly destroyed, the hair is not reproduced; thus in blisters, when properly applied, the cuticle only is raised: but if the blistering matter act very strongly, and the cutis be destroyed, a permanent baldness is the consequence.

Two varieties of hair are seen on the horse, which are thus described by Mr. Percivall: 'The horse is clad with hair of two kinds or qualities; the one is that fine soft material which clothes the body generally, and which we expressively distinguish by the term *coat;* the other, vulgarly known as *horse-hair*, is of a coarser and stronger nature, is confined to particular parts, and appears to have been added rather for the purposes of ornament and defence than those of vesture and interception.'

The Cuticle.

Immediately under the hair is a firm insensible covering to the true skin, called *cuticle*, or *epidermis*. The substance of the cuticle is by no means equally thick in every part: on some its substance is considerable, as on the back and extremities; and on others it is very thin, as over the lips, &c. It appears, as in the human, to be much increased by pressure; hence I have found it of astonishing thickness on the rumps of asses, who are much exposed to be beaten on that part. Over the knees, the points of the elbows, and hocks, it becomes likewise much increased from pressure, and it is also originally given thick to these parts. Within the fore arm, and on the inner side of the cannon behind, it produces a substance not unlike horn, which grows to a considerable length, and is then removed in scales and reproduced. The colour of the cuticle is the same in every horse, let his tints or markings be what they may; and the apparent diversities of tone it presents are wholly dependent on the parts underneath. The cuticle adheres to the cutis or true skin by means of numerous papillæ, which run from the cutis into its substance. These papillæ are thought to be the expansion of the nerves of the skin, the exquisite sensibility of which is modified through the medium of this substance. The cuticle may be separated by maceration and boiling in the dead subject; in the living, by frictions and stimulants, as cantharides. It covers the skin throughout its whole extent, except at the hoofs, which it is probable are themselves only a species of cuticle, or a secretion from the cutis†. This expansion likewise lines many of the large openings made through the skin by the entrance of canals, as the mouth, where the cuticular lining is continued into the œsophagus, and even over the first portion of the stomach. The cuticle is perforated by the sebaceous ducts, by the exhalent vessels, and probably by the absorbents also‡. Through the exhalent orifices, the insensible perspiration passes off; and through the sebaceous ducts, which are evident to the naked eye, the cuticle is furnished with an unctuous substance which keeps it soft and pliant, and which gives it that greasy feel we are accustomed to. Blisters applied, irritate and inflame the true skin, and occasion so great a deposit of serum underneath, that, the cuticle being no longer pervious, the liquid contents present themselves in small bladders. The insensible skin appears formed from a real secretion of the true skin, and is almost endless in its reproduction, forming itself anew in a very short time after its removal from a healthy surface.

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* Animals who lick themselves are subject to have collections of hair in the form of balls within their stomachs: sometimes these collections have increased to such an extent, especially in oxen, as to incommode, and even to kill; they are said to be particularly frequent in the chamois goat, called *Ægagropilus;* and in times of superstition and ignorance these particularly were used in medicine as a species of bezoar. Some hair balls are covered with a thin smooth coat or shell, of which kind I have a beautiful specimen, correctly spherical, extracted from the stomach of a camel: others are naked, and shew the hairs on their surface, being simply connected together by gluten. Horses are but little subject to these hair balls, though now and then they do exist in them also.

† Insensible as is the cuticle, it is convertible, or is modified into the diversities of scales, nails, shells, plates, and hoofs.

‡ Some modern physiologists deny the power of absorption to the cuticle, affirming that whatever passes through it enters by mere imbibition.

The *corpus mucosum*, or *rete mucosum*, is a mucilaginous substance placed between the layers of the cuticle and cutis, the structure and uses of which have not yet been satisfactorily explained. It is found to be difficult of reproduction, and by some it is said to be never regenerated.

The *cutis*, *dermis*, or *true skin*, is a very general and highly organised membrane, whether as regards its vascularity, sensibility, or the intimate reticulation of its fibres. Its density of structure will be apparent when we view it as leather. It is not equally thick in every part of the body; but, like the cuticle, is most dense in the parts most exposed, as may be seen in the extremities, particularly over the fetlocks, knees, and hocks; as well as over the back, belly, and some parts of the head: it is also much more loose and flexible in some parts than in others, to admit of motion. It is connected exteriorly to the rete mucosum and cuticle, and interiorly to the fleshy pannicle and membrana adiposa; and wherever it is so connected it is more loose: in some parts it is even corrugated, as behind the fore legs. Its outer surface is garnished with numerous papillæ, which are small eminences extremely sensible, lying under the cuticle, and received into its depressions; and wherever the skin is most sensible, these papillæ are found most numerous and extensive. The cutis, like the cuticle, is perforated by numerous openings, which are the exhalent and inhalent orifices; and by the ducts of its sebaceous glands, which are in greater plenty in some parts than in others; as in the nose, ears, and parts of generation, as well as in parts subjected to friction*. The cutis is elastic, as we know by the effects of pregnancy, in which it becomes greatly extended, yet soon recovers its former dimensions. The bloodvessels, nerves, and absorbents of the cutis are as abundant as its highly organised structure would give us reason to expect.

Sense of Touch.

This sense is principally operated by means of the skin, which is *universally affected* by many external circumstances, as those of heat and cold, dryness and moisture. But it is by some particular parts, as the muzzle or extremities of the lips, and by the toes, that quadrupeds attempt to distinguish objects from each other *particularly*; and in these it is observed, that the cutaneous nerves are more numerous, and the cuticle thinner. The irritability of the skin is frequently very great: that mixed sensation between pain and pleasure called tickling is an instance of its susceptibility under taction, and which was probably given to warn the animal of approaching danger, as the attacks of insects, &c.

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* Mallenders and sellenders appear to arise from a diseased increase or alteration of the sebaceous glands within the bendings of the knee and hock; and as these follicular openings are very numerous in the heels, so cracks, scabs, and grease are referrible to the same cause. It may be remarked, that the secretion of the sebaceous glands varies according to the necessities of the part furnishing it; thus it is ceruminous in the ears, semi-ceruminous in the glans penis, and unctuous over the cuticular surfaces.

Adipose Membrane and Fat.

The *adipose membrane* forms a considerable portion of the body of most animals; but like the panniculus carnosus, it cannot be regarded as a complete covering or investment, since many parts are without it, as the eyelids, ears, sheath, some parts of the extremities, &c. It appears composed of a number of membranous laminæ, so disposed as to form themselves into cells, neither the number nor the size of which are the same in all parts of the body. In the mesentery, omentum, and about the kidneys, they are large and numerous, and their contained matter is of a more solid consistence: on the surface of the body these cells are smaller, and in the bones, where their contents are nearly fluid, they are very small. The adipose cells do not appear to communicate, or the fat would gravitate; which forms a very essential difference between this substance and the general connecting cellular membrane. It is vascular, and has nerves and absorbents, and is likewise subject to the diseases attendant on vascularity, as inflammation and abscess.

The *fat* is an unctuous juice that is secreted or poured into the cells of the adipose membrane, at first in a fluid form, from which it gradually becomes of a firmer consistence. It appears in greater quantity in some parts of the body than in others, forming in the abdomen suet or lard, while that over the surface of the body, and within the bones, is semi-oleaginous. Different animals have their adeps of different degrees of firmness, from the firm suet of the ox, and the tallow of the sheep, to the soft lard of the hog: that of the horse is of a mixed degree of consistence.

The *uses of this substance* appear to be several: it may be considered as a guard to parts, and its distribution strengthens this opinion: hence it is found covering the nerves and bloodvessels, especially such as are in the neighbourhood of hard parts, and liable to pressure. It fills up most interstices, and thus adds much to beauty: this is instanced in the eye-pits, which in young horses are filled up with this substance: it is useful also in lessening that irritability of the cutaneous nerves so remarkable in young animals; and for which reason we find most of the adeps in early life distributed exteriorly, while that of older subjects is placed mostly within the cavities of the body. In quadrupeds of all ages, the omentum is very plentifully supplied with it, but in some more than in others; in the horse it is proportionally small; and the quantity of abdominal fat *generally* is in him very limited, as it is in most animals destined for extraordinary speed. Even the kidneys of the horse, usually so imbedded by adeps, are in him but sparingly furnished. In well fed animals the fat fills up the interstices of the muscles, and is placed in the cancelli of bones, where it is termed *marrow*. The most important of the uses of the fat to animals, however, is to form a depôt for the support of the constitution under the accidental want of nourishment: hence much fatigue produces a rapid absorption of it. It is from this cause that animals who fast long, from the highest state of obesity become wholly lean and impoverished; and thus the hybernating bear, who enters his wintry habitation surrounded with an immense quantity of adeps, leaves it in the spring greatly emaciated, having been supported during his torpidity by the absorption of this large portion of animal oil, and not, as is vulgarly supposed, by sucking his paws, which probably are only wrapped around his nose, but never enter his mouth. Animals living a life of rest appear to have a tendency to form this fluid, but not in an equal degree; for, in addition to inaction, there must be present a certain disposition of constitution. A particular form of body is favourable to its accumulation, of which the circular carcass, as affording the most room for chylification, is the best example. A superabundant quantity of food beyond the waste of the constitution is converted into this oil: hence full-fed animals are prone to become fat.

Cellular Membrane.

This expansion, and the former, are probably but modifications of each other, and form the innermost layer of the integumental coverings of almost every part of the body. Like the adipose membrane, it is cellular, but its cells freely communicate with each other throughout the whole body; as we see in the practice of butchers, who blow up the newly killed calf from any one point, until not only the surface, but even the viscera, become distended by the air. This cellular structure is exemplified, likewise, by the emphysematous distention which follows wounds of the lungs, as well as the more partial ones, from punctures of the hock and elbow; from which latter cases we learn that these cells have a disposition to *absorb* air also. Cellular membrane is, probably, a more general substance than is supposed, and even ligaments may be but a modification of it with a peculiar arrangement of fibres; nor are aponeuroses, or tendons, very dissimilar. We already know that it exists in different quantities, and in various forms in different parts: in some it is strong and dense, taking on the appearance of ligaments; in others, it consists of the finest laminæ. It is the general connecting medium between parts; it unites the skin to the body; it enters into the interstices of muscles, and is likewise interposed between the various expansions of which parts are made up; it connects filamentary substances, and holds together the granulated: it is also vascular and elastic. Anasarca has its seat within its cells; and it is probable that to some alteration in its structure, as well as to sympathetic influence on the pannicle, that we may often attribute obstinate cases of what is termed *hide-bound.* It is the very seat of abscess.

Subcutaneous Muscles of the Integuments.*

Providence having denied hands to quadrupeds, has given them, in lieu, three pairs of cutaneous muscles, which having a cellular attachment to the integuments, and being extended nearly over the whole body, enables them to corrugate the skin, and thus to shake off dust, prevent the attack of noxious insects, and perform other purposes necessary for their ease and convenience: a general subcutaneous muscular expansion is therefore found only in quadrupeds, and not in the whole of them. In different tribes it has different attachments, and consequently its actions and powers become varied also. In the horse and all the mammalia with short hair, it is, by the extent of its attachments, capable of very powerful and diffused operations. Its centres are usually muscular, and its terminal attachments often aponeurotic, ending sometimes into other muscles or their fascias; by which, as either or any of these become the fixed point or points, the action of the whole may be changed at pleasure, either partially or totally. It acts to greatest advantage when the horse is at rest, because the various attachments are then fixed: considering this fleshy expansion, therefore, as a portion of the integumental covering, I am warranted in removing it from the Myology, conceiving that it will best elucidate its functions to describe it here under the division of its parts, the subcutaneous muscles of the head, neck, and body. *On the head and face* this muscular expansion will be found thin, but strong *(one side only will be described throughout);* extending from the poll over the cheek and parotid vicinage, when, adhering very strongly to the zygomatic crest, it stretches itself downwards to the lips, and loses itself in the labial integuments. *On the neck* it is evidently half muscular and half aponeurotic, extending from the forehead along the crest over the whole cervical surface, connecting itself with the muscles of the neck by tendinous fibres, and more intimately and generally with the cervical integuments.

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* In the earlier editions, this appendage to the common integuments had only that portion of it described in this place which has been long known as the *panniculus carnosus;* but as it is evident that, if it be proper to describe the muscular apparatus of the integuments of the *body* here, it must be equally so to introduce those which operate on the skin of the *neck* and *head* in the same, so I shall follow that course in this edition.

The *subcutaneous fleshy pannicle (panniculus carnosus) of the body* extends from the anterior edge of the scapula upwards, to unite with the cervical portion, and downwards to where its fleshy portion terminates in the upper part of the arm; but is *mediately* continued lower by a union of its aponeurotic expansion, which, uniting with the aponeurosis extending over the cannon, carries the corrugating action thus far. In proceeding over the sides of the trunk, it may be said to be truly fleshy; but the attachments it sends upwards to the spine are most of them semi-tendinous, as those it sends downwards to the median line of the abdomen are principally aponeurotic. In the region of the flank it radiates, as it were, but is nevertheless continued inferiorly and posteriorly by a strong aponeurotic expansion into the groin, partly covering the penis, and is then continued inwards, to unite with the fascia of the inside of the thigh: externally it proceeds, but much stronger, in an aponeurotic expansion, over the muscles of the thigh, blending with the fascia of the fascia lata.—The fleshy pannicle is very plentifully supplied throughout with nerves, distributed to it in very considerable branches, and many of which penetrate it to enter the skin. A very large nervous bundle enters it from under the shoulder, and it receives one or more twigs from between each rib in its whole course: it is likewise as well supplied with bloodvessels from the intercostals and neighbouring parts. It must, therefore, be evident that its irritability is great, and its general living powers very considerable; circumstances very favourable to its functional purposes, of being a constrictor to the skin of almost every part of the body, shaking and corrugating it in any and every direction.

ANATOMY OF THE HEAD.

Of the Head generally.

The parts forming the head are considered as external and internal. The external parts are the hair, the common integuments, the muscles, the glands, the external parts of the organs of sense, the periosteum, pericranium, and the bones by which these parts are supported. The internal parts are the brain and its appendages; the deep-seated parts of the organs of sense, with the cavities attached thereto. Some of these have been already considered in their proper places; such as have not, we shall proceed to describe.

The Ear.

The *ears* are formed of an inner and outer part. The internal parts do not very materially differ in different quadrupeds of the higher orders, nor from the human; but the form of the outer ear is very wisely adapted to the various habits and manners of the animal on which it is placed. The *external ear* in the horse presents a truncated one, obliquely severed, of much elegance in appearance, and most advantageously formed to take in a vast number of sonorous waves or rays of sound; it is singularly mobile*, and easily directed towards the quarter from whence sound proceeds. The hair, which garnishes the tube internally, is long and fine, and guards it from the effects of wet, cold, and the attack of insects; hence the clipping of this close, as is usually done, may prove in some cases very prejudicial: this surface is also furnished, in addition to the general sebaceous glands, with a peculiar and larger kind, called ceruminous, which secrete a bitter whitish substance, intended probably to prove noxious to insects. The motions of the ear are effected by several appropriate muscles*. Its *cartilages* are three; the concha, the internal, and the anterior. The *concha*, or principal cartilage, is that conical body which gives to the ear its figure; it is covered by the skin and muscles externally, and internally by cuticular folds which form longitudinal eminences and depressions throughout the extent of the cavity. This cartilage is fixed to the petrous process of the temporal bone by means of two appendicles, and is further maintained in this situation by ligamentous attachment. Within this, and leading to the auditif canal, is the *annular cartilage*, a small moveable portion, whereby the external cavity is rendered more tortuous. The *anterior cartilage* is situated at the anterior part of the base of the concha; it is irregularly triangular, and has a ligamentary expansion inserted into the parietal bone, upon which it moves freely. The *meatus auditorius externus* is in part bony, and in part cartilaginous; and very tortuous, whereby its surface is much increased: it enters the bony canal in the petrous part of the os temporis, whose extremity is furnished with a cartilaginous appendage. The *membrana tympani* is the covering of a cavity called the *drum* of the ear, from its supposed resemblance to that instrument, over which this delicate membrane is expanded, and by which the inner is separated from the outer cavity. The tympanum, it is supposed, has little muscles, giving it by their contractions different degrees of tensity, and which thereby fit it to receive the impressions of the air. The tympanum is a portion of the *internal* cavity of the ear, being irregularly spherical, and presenting several prominences and subordinate cavities. It contains likewise four small bones, which are named, according to their supposed resemblances, incus, malleus, stapes, and orbicularis; by whose movements it is conjectured the impressions received by the membrana tympani are regulated, and receive modifications from the cochlea and more interior parts. These bones are moved by three muscles, two of which belong to the malleus, and one to the stapes. The internal ear presents several openings; as those of the mastoid cells, the Eustachian tube, and the communication between the cavity and the labyrinth called the fenestra ovalis. The *mastoid cells* are small irregular cavities in the substance of the mastoid processes, lined by a fine membrane, and communicating with each other, having a common entrance near the Eustachian canal. The *Eustachian tube* is an opening at the upper and anterior edge of the hollow of the tympanum, forming a duct which is in part bony, and in part cartilaginous; extending from the tympanum to a great

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* The mobility of the external ear is well displayed in the horse, where this organ is in almost constant motion; and it appears nearly the only double organ of sense that is equally facile in applying one only at pleasure to a functional purpose: the horse is most frequently seen with one ear directed forward and the other backward. In the predacious

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tribes, the ears are so formed as to have their general aspect forward, as in the fox, &c.; in the graminivorous and timid, on the contrary, it is usually directed backward. The one looks and listens before him for prey, the other hearkens to fancied pursuit of enemies from behind.

* Instead of the numerical division after Bourgelat, Girard has named these muscles according to *situation*. Mr. Percivall divides them into four classes: attollentes; musculi proprii conchæ; retrahentes; abducentes. Three pairs of *attollentes* erect or cock the ears; the first approximate, the second depress, and the third elevate them. Of the two, *mus. prop. concha*, the first assists in the elevation, and the second will direct it backward. The uses of the retractor and abductor pairs are indicated by their names.

membranous cavity at the posterior part of the nasal fossa (see *d, fig.* 1, *plate* III).

The *Eustachian cavity* is this large membranous sac, whose use is not known[*]; and whose size and appearance bear no resemblance to the part of the same name in the human, which in him is nothing more than the cartilaginous enlargement of the Eustachian tube; nor is it by any means equally considerable in other quadrupeds: but in the horse it forms a very large cavity, one proper to each side of the head; the two being opposed to each other, but with some intermediate space between. Each is closed by a septum which separates it from the pharynx, by the removal of either of which the cavity is brought to view; when within may be seen a part of the os hyoides, a lingual branch of nerves, the trunk of the carotid, and the continuation of the jugular; all of them passing up its outer surface (*vide plate* III).

The *fenestra ovalis* is usually considered as another opening of the tympanum, although it is little more than a hole of communication between the tympanum and the labyrinth. The *fenestra rotunda* is situated inferiorly to this, and is the entrance to a particular duct in the labyrinth. The *vestibule* is a cavity in the petrous portion of the temporal bone, immediately beyond the tympanum; and the fenestra ovalis is the common opening to them. The *semicircular canals* are three bony furrows which communicate with the vestibule; and the *cochlea* is a double spiral canal, within the pars petrosa, opening also into the vestibule. These spiral convoluted canals, divided from each other by a lamen of fine membrane, are filled with a thin fluid, to perfect the undulations communicated by the drum. The *nerves* of the inner and outer ear are principally furnished from the seventh pair. (See *Neurology.*) Blood is furnished to the organ, both internal and external, by means of the carotids and vertebrals; which blood is returned by the jugulars. (See *Angiology.*)

Sense of Hearing.

The collision of elastic bodies produces phenomena which are called sounds; and thus a tremulous motion communicated to the surrounding medium extends in all directions, and at length reaches the external ear; whose form is admirably adapted to receive a large portion of these sonorous waves, which are then reflected from the cartilaginous sides of the concha, till they reach the bottom of the outer ear. Becoming impinged on the membrani tympani, or ear-drum, they force it into similar oscillations; which being communicated to the fluids in the spiral channels of the inner ear, finally act on the acutely sensible expansion of the auditory nerve[*], and produce those sensations we call hearing. The student may find a most correct anatomical detail and instructive figure of the internal ear in No. 3 of the Farmers' Series, *Library of Useful Knowledge.*

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[*] It has been suggested, that this hollow is probably intended as an assistant to the action of neighing in horses and braying in asses: but as each has a membrane by which it is shut out from immediate connexion with the larynx and pharynx, it does not appear easy to conceive how it can influence these sounds, unless by the oscillations of the membrane itself. Bourgelat speaks of it as a cavity open with the pharynx; but I have always found it, as I have said, separated by a fine membrane: perhaps, in the usual mode of examining it, this membrane has been torn through. From analogy, it would be more reasonable to suppose it connected, as in man, with the sense of hearing.

[*] It may be observed that there is a considerable similarity between the senses of hearing and touch, which both take cognizance of bodies by their mechanical properties; whereas the senses of smelling and of taste are operated on by the chemical properties of the bodies examined. The sense of vision appears to be compounded of both these: the forms of bodies are submitted to our vision by their mechanical admeasurement; but their colours are taken cognizance of by some chemical action of light on the bodies viewed.

The Eye.

The phenomena of vision have engaged the attention of the curious in every age, and the structure of the organ by which these are brought about has occupied the anatomists of every country. It is impossible to contemplate the organ of sense, as a whole, without being struck with admiration, that the same substance, the brain, should, by modifications not to be detected by the minutest examination, produce such varied results as are brought about by the nervous messengers which furnish them with their different sensibilities. The *eyes* of the horse are not situated, as in the human, directly in front of the face, but have a more lateral aspect, to increase his field of view: each may be divided into ocular appendages, and the eye itself. The eye-ball is situated in a funnel-shaped cavity, formed by the concurrence of several bones, called the optic orbit. (See *Osteology*.) Within this socket, the globe, surrounded by its moving agents or muscles, rests on a quantity of fatty gelatinous matter, serving to prevent the effects of friction*; while the optic orbits themselves are lined by a periosteum furnished by the dura mater.

The *Coats of the Eye.*—The *conjunctiva* is a fine delicate and transparent membrane which lines the internal superfices of each eyelid, and is reflected from thence over the anterior part of the globe of the eye: being thus reflected, freedom of motion is allowed, yet the eye is amply secured within the orbit, and the entrance of any foreign substance beyond the duplicature completely prevented. The conjunctive coat, where it is opposed to the pupil, is transparent, to admit of the visual rays; and here, therefore, although it be not entirely deprived of vascularity, it does not admit of any other than the colourless parts of the blood. That portion which lines the eyelids, on the contrary, is more highly vascular, does receive red blood, and forms a secreting surface for the mucus furnished to defend these parts from the irritation of the tears.

The *sclerotica* is the outermost of the more complete investments of the eye, and is likewise the thickest and strongest, forming all the posterior and larger part of the globe; the remainder and smaller portion of the sphere being formed of the cornea, and which has been thought to be only a continuation of the sclerotic expansion in a transparent form, thus giving rise to the terms of transparent and opaque corneas: this coat is but little vascular or sensible, and hence not much subjected to disease. The *cornea transparens*, diaphanous as it is, is yet laminated, as may be seen by either boiling or submitting it to putrefaction. As a tunic, it extends over the anterior part of the bulb of the eye; forming in itself the segment of a sphere, distinct from that portion of which the posterior part of the globe is formed: appearing thus like a segmental portion of a small sphere, adapted to the segment of a larger one; or as though a large cup existed posteriorly, having a smaller cup applied to its margin anteriorly. The convexity varies much in different subjects, by which the focal distance is adapted to the viewing of near or more distant objects, according to the habits and manners of the animal. In man, the focal distance of thé eye is less than a foot, and thus his cornea is considerably more convex. But the horse has to see objects from his eye to the ground, where the substances he most usually studies are placed; in him, therefore, the convexity is less, and the focal distance of his eye is probably some feet. The cornea is in different animals of different shapes, but in all is adapted to their various habits and manners: in the human, it is circular and small; while in the horse, very little of the opaque part, or white of the eye, is exposed; but a very large surface of transparent matter of a horizontal oblong shape is exposed to the influence of the rays, by which means vision is rendered very perfect in him[*].

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* It is the absorption of this adipose substance by age which gives to the eyes of old horses their sunken and retracted appearances, and also that depth of cavity in the pits over them.

The *Internal Expansions.*—The *iris* is described by some anatomists as a muscular apparatus designed to regulate the focal distance of the eye, by directing the rays through particular portions of the crystalline lens; which it is enabled to do by an orbicular and a radiated plan of fibres, whose action contracts or dilates it at pleasure. This moveable curtain is situated within the cavity of the globe, immediately under the cornea, to which it corresponds in shape in all animals, being in the horse, as well as the ox and sheep, of an horizontal oblong; by these means objects on each side can be distinguished, which are such as they most wish to observe; and thus they are not only enabled to see their food, but also to avoid their enemies; which are not likely to attack them from above or below, but on a level with themselves. In man, the direction of the iris is circular; for his habits and manners require, and his intelligence leads him, to take cognizance of objects in every direction. The colour of the eye depends on the iris; thus the human eye is commonly grey, black, or blue: in the horse it is usually brown, but now and then white, when the animal is said to be *wall-eyed.* The space between the inner circumference of the iris is usually termed the *uvea*, or *pupil;* the size of which necessarily increases or decreases as the iris contracts or dilates. The colour of the pupil is dependent, in a degree, on that of the bottom of the eye and the transparency of its humours, but in a degree only; for the pupil of the horse always inclines to a uniform greyish tint, though the substance at the bottom of the eye may be of very different shades. At the margin of the iris are seen some little globular bodies or bags covered with a black pigment, usually attached to the upper margin only; and when any do exist on the lower, they are always small: these bodies appear designed to stifle a portion of the rays; and which, in a contracted state of the iris, when the pupil almost forms a circle, they are able to do by so filling up the remaining opening as to admit but little light. The iris, therefore, it is evident, is a very important part, for by its actions vision is in a great degree regulated. The *choroides* is a vascular expansion spread over the internal surface of the sclerotic coat: the *ciliary processes* are plaits or folds of it, spread on the anterior and outer portions of the crystalline lens; as a part of its connexion to the sclerotica is termed the *ciliary ligament*. The *pigment*[*] is a black mucus spread over the tapetum, and extending over the internal layer of the choroides. The *tapetum* is a variegated expansion at the posterior part of the choroid coat, over which the pigment is spread, designed, apparently, for important purposes; for it is observed that the lighter the colour of the tapetum is, the better the animal can see at night; that is, a less quantity of perceptible rays are necessary to distinct vision in some animals than in others in whom this expansion is darker.

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[*] The corneous coat, so called, is any thing but horny: it is, on the contrary, equally sensible and vascular; and although, in a natural state, it admits only the colourless parts of the blood, yet under inflammation, when the diameter of its vessels becomes increased, the red particles are seen circulating through it; and which equally proves its vascularity, and accounts for its tendency to disease. For a long time this was disputed, and the cornea was considered to be merely cuticular, and, as such, all its diseases were treated mechanically: from whence sprang the ancient empirical and travelling oculists; who, in cases of opacity of this substance, introduced powdered glass within the eyelids; or made use of other means to *rub* or *scour* away the opaque part by mechanical friction: but we now know it to be organized, and possessed of considerable living powers, whereby it exhibits the various phenomena of other parts. It inflames, it deposits coagulable lymph, and it takes it up again; or it suppurates, ulcerates, and afterwards reunites. I have seen in an ox a large fungous excrescence arising from the very centre of the transparent cornea, and which communicated directly with no other part.

The *Retina.*—The last and most important expansion of the eye is the *retina*, so called from its supposed net-like structure: it appears to be an exquisitely fine expansion of the substance of the optic nerve, which enters the orbit at its posterior surface, not altogether centrally: it pierces the sclerotic and choroid coats a little to one side, and, spreading itself over the internal surface of the globe, terminates within a very short distance of the ciliary circle; by this means reaching as far as it is possible for any rays to produce distinct vision: for, as well known, it is only where this expansion exists that the eye is susceptible to the impression of light, or that it can take visual cognizance of objects.

The *Humours of the Eye.*—The *vitreous humour* is of a jelly-like form and consistence, and fills all its globe, except the spaces occupied by the aqueous humour and the crystalline lens; corresponding in extent to the expansion of the retina, and thus occupying the posterior part of the space, as the aqueous fills up the anterior, with the crystalline lodged between them. It is placed in a capsule, the *tunica vitrea*, and appears to be in greater quantity, according to the bulk of the eye, in the horse than in man, and consequently the aqueous humour is less. The *crystalline humour* forms a lenticular body of a tolerably firm consistence, and is therefore more properly termed the *crystalline lens*. It is by the refraction of the rays of light through this substance that vision is brought about; and hence different animals have it of different figures: in the horse it is more spherical than in man, being in the latter as 1 to 2; in the horse as 2 to 3; and in the ox as 5 to 8: in fishes it is still more perfectly globular. Its consistence is not equal throughout, but is more intense towards its centre, by which the visual rays are refracted in a greater degree, and receive the image of objects near at hand: the less central parts being of a much thinner consistence, refract less, and are therefore better adapted to receive those more distant. The lens is said to be laminated: we know it to be highly vascular by the readiness it shews to inflame. It floats within a capsule, and occupies a situation within a fossula in the centre of the anterior part of the vitreous humour, just behind the iris, but is not connected to it: the space between it and the iris, which is very small, is called the *posterior chamber* of the eye; as that between the iris and cornea forms the *anterior chamber*. The *use* of the lens appears to be to increase the refraction of the rays which pass through it, and to modify the degree of such refraction according to the portion of it they penetrate.

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[*] The pigment is generally black in man, but is of varied hues in different animals; and as this variety extends to such as feed alike, its intention cannot be to reflect the colour of the food. In some animals it is altogether deficient, as in the cream-coloured horse, white rabbit, and white-haired human albino; in all of which, the blood circulating in the choroid is seen through the pupil, while in the common eye the vessels are obscured by the black pigment. Many circumstances lead us to conclude, that the dark pigment is unfavourable to crepuscular vision: it is never dark in animals who, like the graminivorous, feed as well by night as by day. In man it appears given to stifle superfluous light (the albino cannot face the sun): on the contrary, in predaceous animals, it appears invariably of a light colour; and, to favour nocturnal feeding in the grazing and browsing tribes, superadded to its lightness of tone, it is compounded also; in them exhibiting a greenish cast, whereby they are enabled to collect in great plenty the rays corresponding to the colour of their food; which is yet sufficiently light to answer the purposes of nocturnal vision. In dogs likewise, who see remarkably well in the night, it is greyish; but in the cat tribe, one of our most nocturnally predaceous animals, it is very light, and adapted to receive all the rays it meets with; and it is more than probable that cats are more completely crepuscular than any other domestic animal. In the owl, the naturalist will at once recognize a familiar instance of this ocular peculiarity.

The *aqueous humour* is a limpid fluid which fills up the anterior and posterior chambers of the eye; that portion of it behind the iris being, however, very inconsiderable. It does not seem to have any proper capsule, but appears to be a secretion of the arteries of the inner surface of the eye, and is therefore capable of regeneration. The *muscles of the globe of the eye* are seven: four of these are termed *recti*, or *straight*, and perform the offices of elevation, depression, abduction, and adduction; and are individually named accordingly. They all arise from the bottom of the orbit, and are inserted into the anterior part of the sclerotica, either above, below, or to one side, according as they are to operate, by a tendinous expansion which extends as far as the edge of the cornea. Two others of the seven muscles are termed *obliquus major* and *minor*, or *trochlearis* and *antagonista*. The first of these arises from the inner and posterior portion of the orbit, and passes obliquely through a cartilaginous ring at the anterior and inner part of it: then returning, it passes under the levator rectus, to insert itself into the anterior and superior part of the globe; this, therefore, can draw the eye forward. The *obliquus minor* arises from near the nasal duct in the angular bone, and inserts itself towards the inner side, under the depressor rectus. Mr. Hunter conjectured, that these two muscles in conjunction could rotate the eye. The *retractor oculi*, or *choanoid*, forms the seventh muscle, and is peculiar to quadrupeds; being a very large and powerful bundle of fibres, which arising from the bottom of the orbit, envelope the optic nerve, and insert themselves around the middle of the sphere. This muscle acts on the globe of the eye by very forcibly drawing it within the bottom of the orbit*, by which means it effectually protects it from injury: and as it exists indiscriminately in omnivorous as well as graminivorous quadrupeds, the term *suspensory* is erroneously applied to it. The *membrana nictitans* appears an appendage to this muscle, having all its actions dependent upon it. It consists of a cartilaginous substance, situated at the inner or inferior canthus; and is hid by the eyelids, except a very small dark portion of it called the *haw:* under inflammation of the eye, a larger portion of the nictitating cartilage projects forward, evidently occasioned by the action of the retractor muscle, which then draws the globe inward to avoid the irritation of the light: for the eye being imbedded in soft fatty substance, can be drawn backwards by a displacement of the fat; which latter becoming pressed forwards, carries with it the nictitating cartilage, and forces it over the eye. From this description, it will be readily seen that this organ acts as a third eyelid, and amply makes up the deficiency resulting from the want of hands*; it even more effectually wipes away the dust, or other foreign bodies, than the fingers can possibly do. Farriers and horsemen call this the haw; and it has been usual, in the practice of the former, to mistake effect for cause, and to suppose that, because it protrudes when the eye is inflamed, it is the offending part. From this, excision of it has been, and is even yet, practised as a remedy; when it is evident the inflamed eye becomes more exposed to the irritating effects of light than before.

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* I was some years since requested to attempt the removal of a considerable excrescence that grew on the transparent cornea of a very valuable ox, in Sussex, where they are used in husbandry. On casting the animal, and forcibly keeping his eye open, the retractor muscle drew the globe so strongly within the orbit, as to elude all my attempts to reach it. It was uncertain and hazardous to attempt getting at the orbitary fossa, and I was, therefore, obliged to desist from my attempt.

The *Eyelids and their Appendages.*—The palpebræ are a species of curtain placed before the eye, which is bisected into an upper and lower lid concavely formed, to adapt them to the ocular globe: the superior is the most considerable, the lower is less, and has but little motion: the places of their union are termed *canthi,* or *angles;* one of which is internal and larger, the other is external and smaller; which latter has a loose attachment to a tarsal ligament: the inferior, or internal, is less angular, and furnishes an attachment to the tendon of the orbicularis muscle. The *tarsi* are the thin cartilaginous rims which form the edges of the eyelids, those of the superior being somewhat larger than the inferior: along each of these *ciliary edges* are seen some little holes called *puncta ciliaria,* which pour out a sebaceous matter from small follicular bodies called *meibomian glands:* the upper lid only is furnished with hairs immediately on the edge, and which are not placed in one, but in several small rows; most abundant on the outer or temporal angle, where light most requires a shield from: the under has a few long hairs only, placed before the marginal edge. The horse has no supercilia, or eyebrows, unless we reckon as such the few straggling long hairs above the eyes. The *muscles of the palpebræ,* strictly appropriate, are two only; one surrounding the whole orbit, having its strongest part above, termed *orbicularis palpebrarum,* which shuts both eyelids; the other, proper to the upper lid, is termed *levator palpebræ superioris,* and arises from the bottom of the orbit, to be inserted into the upper lid, by which means it elevates it. These muscles have a compound and subordinate action, called *winking;* and in all their diversified movements they are much assisted by other fascial muscles. The *lachrymal gland* is a conglomerate body, lodged within the conjunctiva at the upper part of the orbit, in a fossa above the external angle; its several lobuli, together, send out five or six little ducts, which penetrate the conjunctiva, and pour out a saline fluid known as the tears, which lubricate the eye without irritating it, the visual surface being guarded by a mucous secretion of the conjunctiva.—The lachrymal gland can be stimulated to a more than ordinary supply of the tears, which then flow over the cheek: the ordinary supply passes off by an opening termed *puncta lachrymalia,* being guided there by a groove formed by the junction of the eyelids and a fold in the conjunctive membranes, with a protuberant dark-coloured portion situated between the internal angle of the palpebræ and the globe of the eye, termed *caruncula lachrymalia.* Thus directed, the tears are carried into the lachrymal duct†, and so pass into the nose by the *ductus ad nasum.* (See *Osteology*, and *Description of the Nose.)* The vessels of the eye are arteries, from the external and internal carotids: the external parts being furnished by the maxillary; and the internal by the ophthalmic and some branches that penetrate the sclerotic coat; and veins which return their blood by the jugulars. The optic nerve enters the orbit through the foramen opticum, and, piercing the globe, forms the retina: the eye receives rami also from the third, fourth, fifth, and sixth pairs. (See *Neurology.)* From the great vascularity and sensibility of the eye, it is very susceptible of disease; the two principal of which are cataract and gutta serena: both of these in the horse are even more obstinate and incurable than in the human. (See *Diseases of the Eyes.*)

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* The monkey is an exception among quadrupeds, but which may readily be accounted for. Nature gives nothing in vain; and as this animal uses his fore paws with great dexterity, so he is enabled, by this means, to defend his eyes sufficiently: and it is, for the same reason, denied to man.

† Both English and French veterinary anatomists have asserted that the horse has no lachrymal sac; which Mr. Percivall considers as a negligence arising from want of observation. I agree with him, that there is a cavity in the os unguis. In the last edition of this work, at page 220, the 13th line, it is stated that 'the puncta are openings to a

Physiology of the Eye, or the Function of Vision.

Light is the appropriate stimulus to the functional purposes of the eye, enabling it to take cognizance of the figure, colour, and distance of bodies. The visual rays, in their ordinary state, shoot rectilinearly through space: but when they pass through denser media, they do not preserve this rectilinear course, but are bent in a degree equal to the density of the medium through which they pass. This bending of the rays is called their *refraction:* the tendency of which is to bring them to a *focus* or *focal point;* to which point all luminous rays reach, sooner or later, according to the increased or diminished density of the medium they have to pass through; upon which property most of the phenomena of vision depend. This premised, it will become evident that the visual rays meet with several different refractions, or bendings, in passing through the eye. Their course through the cornea and aqueous humour must form their first refraction; that through the crystalline lens will be the next, the powers of which, as a refracting medium, must be great; and in their further course through the vitreous humour they must undergo a still farther bending, till they meet in a point on the retina: thus forming a cone, the basis of which will be the surface of the cornea, and the apex the radiant point.

Amidst the wonderful number of objects that present themselves to the eyes of the animal, it appears as though care was taken, that he should have the means of principally collecting such only as are connected with his views or pursuits. The form of the visual organ is such that no confusion exists from an indiscriminate admission of rays; thus only such enter as are capable of this convergency, or, if any others do penetrate, they become lost in the nigrum pigmentum. It is therefore to be understood that the rays which the refracting power of the humours is able to concentrate, meet upon the retina in a point, or very small circle, within which the object is painted, and that the mind takes cognizance of it through the medium of the optic nerves[*]. As the eye must necessarily require to have a vast variety of objects painted upon it, whose distances are widely different; so there must be some optical adjustment of the powers of the part, to enable it to effect a distinct vision of all objects remote or near. But whether this be effected by the angle formed on the two opposite axes, or, as has been more lately taught, by a muscular power in the lens itself, is not yet satisfactorily proved: certain it is, that after the loss of one eye, time is required for the remaining eye to learn to adjust distances; and this equally in the human and brute subjects[†]. Were it not for some adjust-

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canal within the angular bone.' The reason that a lachrymal sac has been denied to the horse by anatomists, was, because the duct here had not a sufficient enlargement, as in the human, to merit it. It is therefore merely a difference of terms, and both may be right.

[*] In considering vision as achieved by means of an image formed at the bottom of the eye, we never can reflect without wonder at the smallness yet correctness of the picture, the subtilty of the touch, and the fineness of the lines. A landscape of five or six square leagues is brought into a space of half an inch in diameter; yet the multitude of objects which it contains are all preserved, are all discriminated in their magnitudes, positions, figures, and colours. A stage coach passing at its ordinary speed, for several minutes, passes in the eye only over one-twelfth of an inch, yet is the change of place in the image distinctly perceived throughout its whole progress.—*Paley's Natural Theology* p. 32.

[†] Mr. Cline, in his lecture on the eye, used to mention a gentleman who was possessed of a valuable hunter; but which he found became, from an excellent leaper, unable to measure his distances, and therefore, at times, made a violent spring at a low quickset; and, at others, fell far short, and threw himself and rider into a ditch. Upon the owner's mentioning this circumstance accidentally to Mr. Cline, he hinted that it might arise from the loss of one eye; and, on examination, it was found the animal had, unperceived, actually become blind on one side. Nor can horses, in general, who have lost an

ment of the optical organs, the rays reflected from objects very near the eye would fall behind it, and those from very distant ones would, from being almost parallel, meet together before the retina. The mechanical adjustment of the focus, it must be observed, is also assisted by the iris, which lessening the opening of the pupil when we look at minute objects, only permits such rays to pass as penetrate towards the centre of the lens, by which they will be very much refracted; but when the eye regards distant objects, the iris becomes dilated, and the rays are then received through the edges of the lens, whereby their refraction is diminished.

The Nose.

In brute animals, the organ of smelling is, next to that of seeing, the most essential, as it forms the principal means by which they judge of good or evil: consequently we cannot be surprised that the nose of quadrupeds is very differently formed, and much more extensive than in ourselves, in whom the deductions of reason and comparison are intended to supply the instinctive acuteness. In the horse, the nose, it is seen, constitutes a very considerable portion of the head, being formed of two principal cavities; each having an exterior communication with the air, called the *nostril*, and an interior opening at the back of the mouth. The *cavities of the nares or nostrils* are limited anteriorly by the nasal bones, superiorly by the frontal, sphenoidal, and ethmoidal; laterally by the inferior and superior turbinated bones, and posteriorly by the palatine, and palatine portion of the maxillary bones. Immediately above the arch of the palate, the nares reach upwards, and communicate with the frontal sinuses anteriorly, with the ethmoidal superiorly, and with the sphenoidal a little posteriorly as well as superiorly. They are divided in the middle by the septum narium, which is above bony, and below cartilaginous; the bony part is formed by the vomer, which uniting to the spine of the sphenoid, and to the middle lamen of the ethmoid, extends downwards, being received by its anterior edge between the junction of the nasal, and by its posterior into the groove formed by the union of the palatine bones, and of the palatine part of the maxillary with each other. Having extended some way, it unites with the catilaginous septum; which is continued down in the same manner as the vomer, that is, it is received anteriorly by the nasal bones, and posteriorly by the maxillary, till it arrives near the end of the nose, when it bifurcates into two portions.

The *frontal sinuses* are formed by the separation of the two tables of the frontal bones. (See *Osteology*.) There is usually a bony partition which forms them into two equal portions, and frequently other bony prolongations are seen supporting the parietes: these sinuses communicate superiorly with the nasal cavies, and are lined by the same membrane. The *sphenoidal sinus* is formed from a vault in the middle of the substance of the bone of that name: it communicates superiorly with the nasal cavities, and is also lined with the pituitary membrane. The *ethmoidal cells* communicate with the nasal fossæ superiorly: they are formed from the numerous cavities in the ethmoid bone, and are likewise lined by the same membrane. The

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eye, be trusted safely to hunt till they have learned to adjust the distances, which time enables them to do. Mr. Percivall, in his Lectures, seems to doubt whether the loss of an eye will have this effect; and instances a hunter he possessed with one eye only which was an excellent and *true* leaper. As Mr. P. omits to say whether his horse proved so, *directly after he had lost his eye*, we gain nothing by the information. It is well known that the loss of an eye does not *perpetuate* the incapability of judging of distances; but that it does so *for a time*, I have of late taken much pains to assure myself. I am, however, bound to confess, that the effect is not so very obvious in the newly monocular horse as it is in the experiment among ourselves of attempting to pass a pin at arms length by one hand through a pin held at arms length by the other; which experiment, from the optical deception, almost invariably fails. The eyes of the horse are laterally placed, and he thus sees objects with one eye more frequently than man; by which he may *more readily* adjust a focal distance by one only: but whatever is directly in front of him must yet require some accommodation of the organ before one eye can prove as critical as two.

maxillary cavities can hardly be called sinuses; because though the maxillary bone itself forms an immense cavity, yet it is, as it were, shut and nearly filled up by the *turbinated bones*, which have been described in the Osteology; they, however, by their tortuous direction within the nasal cavities, and their cellular and spongy texture, very considerably increase the surface of this mucous membrane, which seems their principal use. The highly vascular and sensible expansion called the *pituitary membrane* lines the whole nasal fossæ throughout all their compartments, and was first correctly described by Schneider, from whence it is frequently called the Schneiderian membrane. It is also continued into the pharynx and larynx[*], where likewise it is equally fine and vascular in all its parts: it is furnished with a mucus secreted throughout the whole extent of its surface, whereby the surface is always kept pliant, soft, and susceptible; by this mucus likewise insects are prevented from penetrating the nose. The evident use of the pituitary membrane appears to be a medium for the expansion of the olfactory nerves, whereby the impressions from the effluvia of different substances are received.

Ductus ad nasum.—The puncta lachrymalia, which we described in the eye, are the openings to a canal within the angular bone (see *Osteology*), called the *nasal duct*, which is continued membranous between the turbinated bones, and terminates by an opening within the nostril near the bottom, where it may be easily seen. This duct carries off the superfluous saline fluid, secreted by the lachrymal gland; but being lined with the pituitary membrane, in glanders it often becomes obstructed; by which the lachrymal fluid is forced over the face; and, as the ulceration proceeds, purulent matter at length flows out at the puncta lachrymalia. In inflammations of the eye, the puncta likewise becomes so inflamed as to be impervious for a time; hence a horse in this affection is commonly observed weeping.—The *ductus communis narium* is a second duct of the nostrils, which passes into the pharynx, being formed by the junction of parts originating in the floor of the nostrils. The common integuments of the body are spread over the nose, except that there appears here but little adipose membrane; it is likewise furnished with fine hair to the edges of the nostrils, and is internally lined throughout with the pituitary membrane, except the inner edge, which is supplied by the skin; but even here it is blended, as it were, with the mucous covering. By an inflection of these integuments, a well known fossa is formed in each nasal cavity, called the *false nostril*, which communicates freely with the chamber of the nose, and opens outwardly in common with the external nares. The nasal opening is furnished with a semilunar cartilage enveloped within its membranes, by means of which the surface is kept dilated. The nose is influenced in its motions by means of muscles, as under[†]. Its bloodvessels are numerous, both for its living and functional purposes (see *Angiology*). The nerves are furnished from the first and fourth pairs. The olfactory have been already described as very large hollow tubes, which are expanded into a pulpy mass over the whole pituitary surface, rendering it highly sensible to impressions received from the effluvia of bodies. The external parts are furnished by a branch of the fifth pair. (See *Neurology*.)

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[*] This connexion furnishes us with pathological reasons why catarrhal affections so readily translate themselves to the lungs; the inflammation creeping thence from the pharynx and larynx, by the bronchia. It is on the same grounds that, when pneumonia exists, we examine the pituitary membrane of the nose, to detect the degree of it, that membrane being exquisitely fine and open to impressions.

[†] *Dilator naris anterior*, opens the nostrils, being attached to the cartilages of the open fossa; above to the nasal bones, and below to the lip.—*Nasilis brevis* appears particularly to act in widening the nasal opening also, though its action may be compounded. It surrounds the inflexions of the false nares, and attaches itself to the suture of the maxillary bone.—*Levator labii superiores alæque nasi*. This muscle of the lips lends a slip of attachment to the nasal bones, and to the lateral parts of the skin of the nose anteriorly, by which it is drawn forward.—*Dilator naris lateralis* is a flat pyramidal slip, spreading over

The Physiology of the Nasal Organs.

Comparative anatomy shews that the organs of smell are in most animals placed at the entrance of the respiratory organs; by which they are made subservient to both purposes of breathing and smelling, and by the same means are rendered as well voluntary as involuntary agents; for the action of respiration will carry all the effluvia from bodies, whether sought for or not, against the sensitive pituitary membrane. The herbivorous tribes smell vegetable matters better than flesh; and, on the contrary, carnivorous animals take little cognizance of vegetable bodies: it is also to be remarked, that in the carnivora the ethmoidal and turbinated cells are lamellar; whereas in the herbivorous and ruminant they are spiral and convoluted, whereby their surface of capacity is greatly increased. In all the vertebrated animals, the parts connected with the organ of smell are, like the parts composing the other organs of sense, double. The cognizance taken of the volatile parts of bodies continually flying off from them, and impressed on the sensitive surface of the nose, is transmitted by the nervous expansion of the olfactory nerves to the brain, where it produces the sensation we understand by the name of smell.

The Cavity of the Mouth, with its Parts.

This cavity in the horse forms all that extensive opening from the first cervical vertebra to the incisive teeth; bounded above by the palatine arch, and below by the tongue; thus it becomes divided into the mouth, properly so called, and the large posterior cavity which unites and partly forms the pharynx. The mouth itself is composed of external and internal parts; the external are the lips, cheeks, and beard; the internal are the gums, the bars, the teeth, the alveolary edges, the palate, the septum palati, and the tongue. The *lips* form the inferior and external parts of the mouth, and are two in number; an upper and lower, or anterior and posterior, each being composed of fleshy masses fixed in different directions which extend around them jointly; but principally a circular one is apparent, forming the orbicular muscle, or sphincter oris: the rest are composed of the numerous muscular plans that perform the various motions of the mouth and lips, as noticed below*. They have, beside these muscular strata, a species of pecu-

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the lateral parts of the cheek and nose, so as to act as an antagonist to the former,—*Nasalis longus labii superioris* is a fleshy expansion, stretching from the lower part of the orbit, down the anterior part of the upper lip; giving a portion to the false nostril, which acts in drawing it, together with the lip, directly upwards, in that sniffing singular grimace common with stallions after smelling a horsing mare.

* The muscles of the mouth and lips are thus accurately named and described by Mr. Percivall. *Zygomaticus*, arising by tendinous fibres from the zygomatic process of the malar bone, to be inserted into the angle of the mouth, by which it is drawn upward and backward.—*Levator anguli oris*: from the side of the os nasi into the angle of the mouth, upper lip, and nostril; thus at the same time retracting the lip and dilating the nostril.—*Levator labii superioris*: from the side of the face, gives a tendinous portion to the false nares, unites with its fellow near the points of the nasal bone, and then expends itself in common union with the orbicular. It raises the upper lip, dilates the false nostril, and, in union with its fellow and the nasalis longus, it raises the upper in the remarkable manner of stallions, who, having received some of the effluvia from the sexual parts of the mare under her œstrum, thus elevate the lip to apply it more closely to the nose.—The *dilator narium* is common to the nostril and upper lip.—*Retractor anguli oris* draws the

liar cellular substance interposed. The outer covering of the lips is not exactly like that of the other parts, being nearly devoid of hair, and altogether its structure is much thinner and finer; by which means it possesses a greater sensibility, which is of importance to an animal that makes use of the lips as the organs of touch. As the outer membrane is reflected to line the inner side of the lips, it becomes of still more vascular and villous a texture, and combines with the glandulous or mucous membrane of the mouth. The muscles of the lips, as we have seen, are numerous, and their motions thereby so various that the animal is readily enabled to collect his food, and to form and place it between his teeth by their assistance; by these means likewise the young colt sucks in its milk; and, in fact, so varied are the dispositions of the muscular plans around the mouth, that, like the tongue, there is no direction in which the lips cannot place themselves. The bloodvessels and nerves of these parts are numerous, as might be expected from their great vascularity and sensitiveness (see *Angiology* and *Neurology).* The *gums* are formed of a very vascular compact and elastic substance, completely surrounding the neck of each tooth, and, as this substance is also adherent to the periosteum of the maxillæ, so it supports the teeth firmly in their situations. It appears itself formed from a union of the proper membrane of the mouth with the cuticle; thus it participates in the colour of the general skin, being sometimes light and at others dark: this membrane, continued from the posterior part of the alveolary edges, blends with the membrane of the tongue, and at its under or posterior part thickens itself into a frenum or bridle, by which unnatural displacement of the tongue is prevented. On each side of this lingual bridal is seen the small nipple-like termination of the maxillary and lingual glands, which the French have called *barbillons*, and the English barbs, paps, flaps, &c., as I shall further notice anon. The substance of the gums, though very plentifully supplied with bloodvessels, is but sparingly furnished with nerves; thus they are more vascular than sensible: were it not so, the hard substances taken into the mouth, as corn, hay, &c., would hurt them by its pressure. Under inflammation they are, however, highly sensitive.

The *bars*, anatomically considered, are spaces left by nature between the teeth, from the great length of the jaws; for incisive teeth continued up so high would have been worse than useless, because, as they could never be brought into action, their wear would not have been equal to the others; and thus they would in the end have starved the owner: nor was it necessary that the molar teeth should reach thus far; for being removed so distant from the centre of motion, the animal would have found their power very disproportionate to those behind them. But Nature follows throughout her

mouth backwards.—*Buccinator* is the fleshy mass which fills up the space of what may be called the cheeks; by its connexions with the upper and under jaws, and the buccal membrane also, it is of extreme importance in the act of grinding the food.—*Orbicularis oris* is the muscular mass which extends around the lips; stronger in the upper than the lower; mixed with much cellular tissue, and a considerable quantity of nervous and vascular branches. It closes the lips, and gives them their prehensile power: its extreme sensibility makes it the principal organ of touch, as we know from numerous actions of horses towards each other, and towards those persons to whom they are attached; and hard must be his heart, who has not been pleased by the labial caresses of his horse.—*Depressor labii superioris* are fleshy fibres arising from the alveolar portions in front of the upper jaw, and inserted into the upper lip as well as the alæ of the nose.—*Levator labii inferioris* has the same origin, and the same insertion in the lower jaw as the last had in the upper, by which it serves to elevate the under lip: it is to a partial paralysis of this muscle by age that the old horse presents so pendulous a posterior lip as we occasionally see.

works a similitude, and blends the general animal characters into each other; she has therefore here placed a solitary *canine* tooth, which at once breaks the vacancy, and forms a connecting link between the carnivorous and herbivorous tribes. This space has been advantageously seized on by man as a convenient and certain means of ensuring the obedience of the horse; and we thus find that, in every cultivated country, the *bars* are made subject to the pressure of a rod of metal, in England called the bit. These continuations of the alveolary borders are in some horses more crested or sharp than in others; they are also more or less thickly clad with the substance of gum in different subjects, as well as that the gums themselves are not equally sensitive in all horses; to which diversities of structure we owe the terms of *hard* and *soft* mouths, or, as the anatomist would say, ' sensible and insensible mouths.' The teeth, as parts of the mouth, have been already fully considered with the general osteology of the body.

The *palate* is divided into its arch and its septum, or into the hard and soft palate. The *hard palate* is the roof of the mouth, and is a rugous membranous structure, adhering by its inner or upper surface to the bony *arch* formed of the palatine portions of the superior and inferior maxillary bones. The rugæ of the outer or mouth surface are more distant from each other, and larger in the inferior part of the arch towards the incisive teeth, than in the superior and farther part of the mouth; and appear to be formed of the common integuments with a dense cellular substance intermixed, which is laterally connected with the membrane of the gums. In colts and young horses this part is naturally thicker than in old ones: sometimes it becomes morbidly so much swollen as to reverse the palatine arch, making it convex instead of concave; in which cases it is usual, with farriers, to say the horse has *lampas*, and the swollen part is commonly cauterized or scarified; putting the animal to unnecessary pain, perhaps producing caries of the bone, or otherwise a violent hæmorrhage, by dividing the palatine bloodvessel. It is true that the rugæ may become relaxed and tumefied, particularly during dentition, and on extraordinary cases may be *topically* affected; but the cause is usually to be sought for elsewhere (see *Lampas, Dentition*, and *Condition*). The *use* of this rugous surface is to prevent the food under mastication from displacement by the inclined situation of the head: in the human mouth they are much less evident, as being but little necessary, from its more horizontal placing.

The *velum palati* forms the posterior portion of this arch, and is attached to the palatine edges; laterally, appearing as though it were a continuation of the membranes of the palate mixed with muscular fasciculi. It presents an inferior or posterior opening, thus dividing the mouth from the pharynx; itself having its superior or anterior portions fixed to the palatine bone, where the arch of the palate ceases. Its sides have a lateral attachment, and its centre floats loose within the cavity, like a curtain of division between the parts, but presenting a small central arched opening. The horse has no uvula, but its place is supplied by a greater extension of the velum palati, so that the posterior opening of the mouth becomes exactly closed up by the *epiglottis*, which is embraced by its edges; thus, except when the horse be swallowing, there is no immediate communication between the mouth and the pharynx, and none whatever with the nose. The cavities of the nose open into the pharynx, and the larynx opens likewise into the same hollow: as, therefore, the communication between the mouth and pharynx is shut out, it is evident that the horse cannot breathe by his mouth;

and when any air is expired by this way, as in coughing, it can only be by a convulsive displacement of the velum palati. The œsophagus likewise opens into the pharynx, consequently there is no *natural* passage for the food either; and it is only by a still greater convulsive effort, which even more *unnaturally* displaces the parts, that regurgitation can take place in the horse. In truly regurgitating animals, the velum palati is less extensive; such likewise can breathe through the mouth, which the horse is not naturally formed to do.

Though the curtain of the palate cannot be carried forward but by a very convulsive effort, it can be readily elevated and carried back by means of its muscles, which are difficult to characterise. Mr. Percivall resolves them into *levator palati*, which arises from the temporal bone and is inserted into the curtain. *Tensor palati* is a muscular plan of fibres which surrounds the arch, and indeed it forms much of its substance. It is, however, connected with numerous other muscular fasciculi, particularly with some fleshy pillars or half arches, which, by their insertion into the base of the tongue, greatly diversify its action, and bring it into accordance with the other parts concerned in deglutition. It is therefore by means of these united muscular plans that the velum palati becomes elevated, when the masticated bolus passing over the epiglottis presses it down, whereby the opening is at once increased, and the cavity of the larynx shut, so that nothing is permitted to pass from the pharynx to the mouth, but every thing readily slides from the mouth to the pharynx.

The *tongue* is that large fleshy mass which fills up the channel or space between the branches of the posterior jaw, being surrounded by the alveolary border, and extending upwards, so as to adapt itself to the arch of the palate. (See *plate* III.) Like the other organs of sense, it presents a double formation; and although its median line of division is not so evident as in some animals, it is yet so perfectly double that the two portions have each their separate organs of sensation, volition, and nutrition. It is extremely moveable, being almost wholly composed of muscular fibres; the extent of its motions being assisted by the nature of its attachment, which is principally by its base, the muscular fibres of which part are strongly implanted in the hos hyoides and posterior maxilla; its under surface being further connected to the parts around by means of a frenum. It is covered by integumental tunics, which over its anterior surface assume a particular structure, and is studded with conical papillæ and a thick reticular structure of rete mucosum*: this papillary texture pierces the rete mucosum, with a portion of the cuticle over it; while the anterior surface presents a pure covering, and exhibits none of these eminences. On examination, these papillæ appear of different forms: in some animals they are very large, as in the ox, bear, and some others: between them are seen follicular openings, from whence the mucus of the tongue is derived. The muscular fibres of the tongue take almost every direction, and present a whitish substance transversely interposed between them, which substance is in greatest quantity towards the base. The fibres in the central parts of the organ are placed in various ways, that the motion may be performed on all sides: besides which, there appears a perpendicular plane immediately under the surface, whereby its mass is shortened. Its *proper muscles* are those which pass between it and the os hyoides; as the *Genio-hyo-glossus*, which projects the tongue; the *hyo-glossus longus*, which retracts it within the mouth; the *hyo-glossus brevis*, which assists the last, and depresses the root of the tongue: *lingualis* is a part of the appropriate side of the tongue itself, extending from the base to the point, and furnishing attachments for all the others. Blood is very plentifully supplied to the tongue by the *lingual* and *raninæ*. (See *Angiology*.) The nerves are derived from the lingual, or ninth pair, which furnishes the muscular mass; while its exquisite perceptions of taste are principally drawn from a branch of the fifth pair, called the gustatory, whose ramifications are expended on its papillæ and tasting surface. It is an organ of great sympathy, and its extensive nervous connexions favour this sympathetic property. By the ninth pair of nerves it is connected with the larynx and pharynx, as well as by the glosso-pharyngeal, which nerve is divided between the tongue and pharynx, and connects these parts in deglutition, while the gustatory unites the actions of the tongue and salivary glands. The associations of these three nerves produce a general consent of action between the tongue, the pharynx, larynx, œsophagus, and salivary glands. (See *Neurology*.) *For an exemplification of these parts, see plate* III. The tongue is a very principal organ in mastication: by its great mobility it carries the food into every direction the most favourable for the purpose, and, finally, passes it to the pharynx.

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* The rete mucosum is not observed in the human tongue: hence, however black the negro, his tongue is invariably red. In the two former editions of the VETERINARY OUTLINES, *posterior* surface was less properly used than *anterior* in the present: *posterior* was, however, then equally intended to express the hinder parts of this organ, which it is well known are the seat of the gustatory eminences (as these papillæ are supposed to be), and as we know by ourselves, where it is by the base (and most justly, in man, the *posterior* part) of the tongue that we principally exercise our sense of taste, though strong, sapid, acid, and caustic bodies are sufficiently recognised by the tip also; probably more so in him than in most animals, in some of which the apex is purely cuticular.

The Physiology of the Mouth and the Sense of Taste.

Taste appears to be derived from a property in the mouth of fluidifying whatever is received, in which it resembles the sense of smell: for although that exerts its influence in the form of gas, yet moisture is necessary to both, and both operate by their chemical qualities; whereas the matters taken cognizance of by touch depend on their mechanical properties. The tongue, which is the organ of taste in all vertebrated animals, possesses an exquisitely modified sensibility, and in brutes is endowed also with a salutary instinct. In man, civilization, by heightening the intellectual, has weakened the instinctive powers, if they ever existed. Taste was given to brutes to regulate their other senses, and thus there are few plants or substances whose application to the tongue produces an agreeable effect but such as are proper for food. It must, however, be confessed, that the discriminating quality in brutes, with regard to food, is greatly assisted by their sense of smelling: the horse will not touch the water from a greasy bucket; and his refusal takes place before he has absorbed a drop. Nature, therefore, stimulates her creatures to take food by a double motive,—the pleasure of taste and the pain of hunger.

The Pharynx.

I shall consider and describe as the *pharynx* all that considerable cavity which is superior and posterior to the mouth, properly so called; and so divided from it by the velum palati and epiglottis as to have no communication with it, except when either swallowing or coughing. The pharynx is therefore a distinct cavity, within which are seen the two nasal fossæ, the cavity of the larynx, and the opening of the œsophagus. The manner in which the nasal fossæ open into the pharynx is best learned by a reference to *plate* III, where their true situation is at once seen. The *Eustachian cavities*, which have been already described with the ear, are shut from immediate communication with the pharynx by means of their membranous covering: each cavity is placed on one side of the pharynx, immediately behind the base of the skull, as seen in *plate* III. The pharynx is muscular throughout, and its principal plans of fibres tend to constrict it in the act of deglutition. M. Girard describes six pairs—the Pterygo, Kerato, Hyo, Thyro, Crico, Arythèno-pharyngien, all ending and originating in the pharynx, as their names imply. Mr. Percivall considers the pharyngeal muscles as three constrictory pairs, designated by their situation, superior, medius, et inferior.

The *larynx*, which is the opening or commencement of the trachea, is placed in the posterior part of the pharynx, and forms a kind of cartilaginous box, which is composed principally of five pieces, so situated between and connected with the branches of the os hyoides as to have very small lateral motion; but an extensive one above downwards, forwards, and backwards, as it may be acted on. The *os hyoides* was purposely omitted in the Osteology, that its relative situation might unite with its description. It consists of five bony portions articulated together. The body, as aptly observed by Mr. Percivall, very much resembles a common spur, the segmental portion embracing the margin of the palate, and the appendicular portion pushed forward to support the root of the tongue. From the posterior ends of its body spring two other appendices, likened, by Girard, to the handle of a fork, '*manche de fourche*,' which also support the substance of the tongue: from these also arise two bony prolongations or horns, or prongs of the fork, to which the upper border of the thyroid cartilage is fixed. (See *i i*, *plate* III, *fig*. 2.)

The laryngeal cartilages are, the thyroid, cricoid, the two arytenoid, and the epiglottis. (See *plate*.) The *thyroid cartilage*, the most considerable, forms a kind of half circle, having a longitudinal convexity on the anterior part, and concave within: it is united to the lateral and middle parts of the cricoid cartilage; superiorly it is received between the branches of the os hyoides, the epiglottis being situated, as it were, at its anterior part. The *cricoid* cartilage is a thick ring-like cartilage partly received within the thyroid, to which it is united by a ligament; articulating above with the arytenoid, with its base united to or rather overlapping the upper part of the trachea. The *arytenoid* are two small similar cartilages, situated posteriorly above the cricoid, and rather within the cavity of the larynx, uniting together at the beginning of the glottis: their concave inferior surface receives the superior convex surface of the cricoid cartilage, and the superior extremity forms a kind of point, which is curved backwards. The *epiglottis* (see *plate* III) is a very elastic body, situated and attached to the anterior portion of the thyroid cartilage by a strong ligament. Its internal surface is concave; its external is slightly convex, and its termination forms a point which is curved forward, giving it something of a heart-like shape. This cartilage is of the utmost importance to the animal; it exactly fills up the floating arch of the velum palati, thereby shutting up the cavity of the mouth, and forcing the animal to breathe through his nose, in ordinary cases: but when mastication has formed the alimentary bolus, and presses it downwards, it then equally closes the glottis, fitting exactly to its *rima*, by the assistance of two cartilaginous slips; thus forming a new apparatus, by means of the same organ, to effectually prevent the entrance of any thing within the trachea. As soon as the bolus has passed, the epiglottis by its elasticity, and, perhaps, assisted by muscular fibres, returns to its situation. And here we must, in a particular manner, admire the wisdom of its formation: had it been ligamentary, and influenced in its actions by muscles only, it would continually have endangered the animal, for numerous diseases might affect the muscular energy: but the cartilaginous elasticity is never lost till the body falls into a state of decomposition and decay. The *glottis* is nothing more than the oval opening into the laryngeal box, formed by means of the cartilages, and their numerous connecting membranes and ligaments.

The larynx gives insertion to a great number of muscles, and its motions are consequently much varied; some of these muscles operate on the whole of it as a body, and have their attachments in other parts; some operate only on particular cartilages, but are wholly inserted in the larynx. The *hyo-epiglottideus* is a single muscle connected with the hyoides; and is inserted into the expanded portion of the epiglottis, which it stretches open. The other laryngeal muscles act in pairs: the *crico-thyroidæi* draw the opening downwards after it has been raised in deglutition; it is elevated in this action by the *hyo-thyroidæi*. The *crico-arytenoidæi lateralis* and *posterioris*, thyro-arytenoidæi, are muscles appropriated to their specified cartilages; by means of which the cavity of the larynx is altered in its figure and dimensions, and the sounds of the voice become variously modulated. The *thyroid glands*, situated one on each side of the cricoid cartilage in the horse, are two oval bodies, and, like the single one of the human, are larger in the young than the old subject; but their functional purpose is unknown. The bloodvessels of both the pharynx and larynx are derived from the carotids and jugulars. Their nerves are furnished by the recurrents; they are also connected with the glosso-pharyngeal, and with rami from the fifth, seventh, and other filaments; thus not only uniting the surface of these great and important cavities into a sympathetic action with the parts around, but also with important viscera of the body. (See *Neurology*).

Uses of the Larynx.—This part answers two very principal purposes in the economy; it is the organ by which air is received into the lungs; it is likewise the organ of the voice: hence, if the recurrent nerves, which furnish this part, be divided, the voice is entirely lost. The cartilages of the larynx are moveable one upon the other, and are furnished with muscular cords named *cordæ vocales*, which tighten or relax this sonorous box, which being acted on by the aerial vibrations within, the undulations are transmitted to the ear[*].

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[*] The variations of sound emitted by the voice of different quadrupeds appear to consist principally in the number and form of the laryngeal sacs. There are usually three of these, one of which is seen under the vault formed by the anterior boundary of the thyroid cartilage, having its aperture near the root of the epiglottis. The other two are oblong sinuses contained between the lateral parietes of the glottis and the thyroid cartilage, and are covered in a great measure by the arytenoidei muscles. In the horse these lateral sacs are very long and wide, and are not unlike the usual ventricles of the glottis. The aperture of the outer cavity is very large in the horse; in the ass the opening into each of the three sacs is a small hole, and the anterior sac forms a bag-like cavity. In the mule these organs differ, but their anatomical formation is in general blended between the horse and ass. The various sounds emitted by animals are abitrarily named, without reference to the sounds themselves: thus we say the horse neighs and the ass brays. *Neighing* appears produced by expirations, as are most of the tones of voice from the horse. The vibrations produced by the resonance of different sized cavities, assisted by the tremors of the cartilages of the nostrils, produce the compounded sounds which are emitted. *Knuckering*, as it is termed, is only a lesser neigh, with shorter, deeper, and less forcible tones, and expresses affection and joy. The horse has one acute sound, produced by the act of inspiration, which usually expresses either play or lust; but in most other instances, sound in the horse is produced from expirations; nor does it appear that the tongue or teeth are much concerned in the modulations of his voice; but in dogs they are very much so. In the ass, the principal sounds are those of *braying*, and perhaps he differs in no respect so much from the horse as in the sounds he emits, which is another very strong proof that an ass is not a horse degenerated, as has been supposed by some. Braying appears to be produced through the mouth by a convulsive displacement of the velum palati, assisted by the vibrations occasioned by the extent of the laryngeal sacs, and by their being so much separated from the cavity of the larynx: it appears effected by alternate inspirations and expirations; the inspirations forming half tones, and the lengthened notes being formed of expirations. The *lowing* of oxen is likewise performed through the mouth; and the *bleating* of sheep also: hence it would appear, that the mouth is better adapted to convey sound than the nose: or at least it produces more variety in tones, though the passage is not so direct. *Barking* is formed of short continued expirations, with the jaws very slightly separated; succeeded by a quick and forcible expiration, the mouth being alternately opened and shut. A dog produces more tones

The Physiology of Mastication and Deglutition.

Animals have organs wisely adapted to their wants. The reception of food into the stomach is a process of great importance, and is managed with a most instinctive dexterity. The natural food of the horse is grain or herbage, usually collected near the ground. When a horse grazes, he crops the grass with his incisive teeth, first placing by his lips a tuft between them, when, elevating his chin, the sharp edges of the under ones become applied to the grass, and cut it through: were it torn up, instead of cut off, the horse would be under the necessity of taking up roots and all; therefore, it will be found, the prominent edges of these teeth are all wisely adapted to this process. Oxen and sheep, wanting upper nippers, wrap a tuft of grass round with their tongue, and then apply it to the under incisive, by which it is cut off; and thus we find that they are obliged always to carry the chin forward in collecting their grass. When a quantity of herbage is thus gained, it is carried by the tongue and molar muscles to the upper part of the mouth, to encounter the action of the grinders, for which their broad flat surfaces are admirably adapted: the matter being carried from side to side, to be placed in the most favourable direction for perfect mastication, by means of the tongue and molar muscles. During this process, it continues to be mixed with the salivary fluid, from the parotid, maxillary, and sublingual glands, which pour out their secretion by the pressure of the surrounding muscles: and for which reason, that is, to be subjected to this pressure, these glands are so placed as to be near the motion of the muscles used in mastication. Pressure is, however, not their only stimulus; they are also acted on by a sympathy existing between the stomach and themselves: thus we observe, if victuals be placed before a hungry dog, just without his reach, his jaws will pour out saliva in great plenty. |

The vegetable mass having been thus completely masticated, is, by the tongue, carried backwards and upwards into the pharynx, which forces the epiglottis down, so as exactly to cover the glottis or opening of the larynx; the velum palati being at the same time carried backwards so as to close the nasal fossæ: the mouth remaining closed during this action, that the muscles may find a fixed point. The pharynx then, it will be seen, first sinks to receive the bolus pushed into it by the contraction of the tongue, and then rises, elevating the funnel-like extremity of the œsophagus, into which the bolus is forced; being shaped in its passage by the constricting powers of the pharyngeal muscles. Having entered the œsophagus, it is propelled backward towards the stomach; not, as heretofore, by volition, but by a functional necessity, dependent on the muscular structure of the alimentary tube, whose power acts against the gravity of the food, as well as independent of the will. But, until the bolus has entered the œsophagus, deglutition is altogether an act of volition, and cannot be performed without the assistance of the tongue[*].

The Glands of the Head.

These are folliculose, mucous, and salivary, with the cerumino-sebaceous of the ears. The *salivary glands* secrete the fluid we call saliva, and are three to each side of the head, the parotid, the submaxillary, and the sublingual. The *parotid* is a considerable body, situated in the hollow formed by the articulation of the head with the neck, stretching around from the root of the ear to the angle of the lower jaw, attached to the upper branch of the jugular; another portion fills up the triangular space between the upper and lower branches of this vein. It is distinctly lobular, its lobes being connected by cellular membrane; and from each of which ramify an infinity of minute tubes, which finally unite into one common trunk. The *salivary*

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than most quadrupeds; his howl consists of a great variety of notes; but are all, except the *whine*, formed with the mouth open. *Snarling* is effected by a tremor of the velum palati, and can be brought about equally by expiration or inspiration. The *mewing* of a cat is produced by expiration, both through the nose and mouth; beginning with the consonant *m*, and continued by passing the air through the nose, and then following it with a more steady expiration through the open mouth, the shutting of which produces the final expression. The *grunting* of hogs appears generally composed of expirations, and can be effected either through the mouth or nose: it consists in a convulsive tremor of the curtain of the palate during the expiration: their cry of distress is effected through the mouth by expirations forcibly directed through a constricted larynx: thus persons, when killing pigs, usually tie the mouth, to drown or lessen the noise.

[*] A woman, who had lost this organ, was forced always to place the food, by means of a spoon or fork, quite into the pharynx, or she could not swallow; so animals who have been deprived of the tongue, elevate the head to let the substance gravitate: hence becomes evident the folly of those farriers who attempt to give a ball, yet the whole time confine the tongue till they suppose it is swallowed; for, by preventing this organ from being raised at its base, the ball cannot be carried back, but either remains stationary, or gets into some of the interstices of the mouth.

duct thus formed (see *plate* IV) finally quits the gland about the centre of its anterior edge, passing along the tuberosity of the jaw, within the inner surface of which it proceeds to the extremity of the tuberous ridge, when it crosses over the posterior edge of the jaw, in company with the maxillary artery and vein, and pierces the muscles and integuments of the mouth, frequently between the second and third molar teeth, and sometimes directly opposite one or the other of these; forming itself into a bulbous rising, or, as Girard describes it, *un gros tubercule hémisphérique*. It is an inflammation and suppuration of either these or the submaxillary glands which forms the complaint called strangles. Farriers call these glands *vives*, and any affection of them they name vives also; and a number of gross prejudices prevail among them relative thereto. From the structure detailed it will be apparent that, when an artificial opening is necessary to be made in the parotid gland, great caution is requisite to select a proper part for the operation, which it is evident should be distant from the course of the excretory duct, or a fistulous opening, most difficult to close, may be formed, and the animal permanently robbed of the saliva of that side.

The *submaxillary*, though much smaller than the parotid, is still a considerable gland, situated within the great hollow of the posterior jaw, its upper part being near the condyloid process of that bone, and its lower pointed extremity occupying the angle; superiorly, being just within, and under the parotid glands. Its duct passes under the mylo-hyoideus muscle, and under the tendon of the digastric, and penetrates the membrane of the mouth, and on the sides of the lingual frenum, about an inch and a half from the lower nippers, by an orifice proper to each gland, which projects up into a nipple-like rising. (*Vide plate* III, *fig.* 2, *n. n.*)

The *sublingual gland* is still smaller than the submaxillary, and is placed along the under part of the tongue, where, from its lobular form, it becomes easily detected. It pours out its secretion by little papillary orifices, which may be traced on a rising line on each side of the frenum of the tongue*. The *labial glands* are placed under the common membrane of

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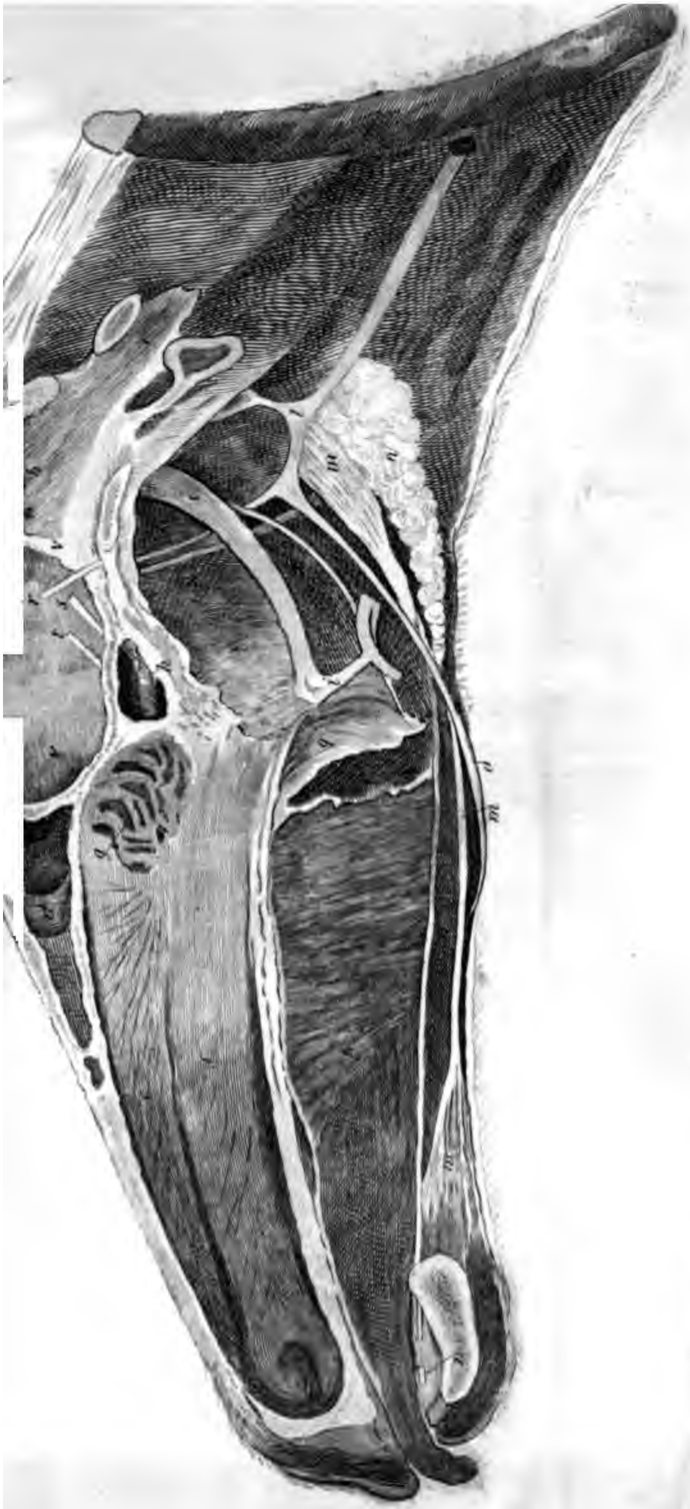
* These membranous terminations of the salivary ducts have been supposed valvular, to prevent any of the edible matters from entering their canals; but whether so or not, they have proved sad stumbling-blocks to both the learned and the unlearned. Even Bourgelat, the French *father* of the art, and our original anatomical guide, terms them '*les excroissances contre nature*.' It is hardly, therefore, to be wondered at that Bracken, the English *father* of it, fell into the same: and still less, that Bartlett, his copyist, should have so totally mistaken their origin and use as to have branded them as the occasional cause of those inflammatory appearances which arise within the mouth from catarrh and febrile affections generally; and which presumption was the more strengthened, as, under such circumstances, these processes become more prominent than usual. With such authorities before them, we are not to wonder that the farriers of even later days, regarding them as useless at all times, and as hurtful sometimes, are anxious to remove them; and our books on farriery present repeated directions to *excise* them, under the various terms of paps, barbs, bladders, flaps, and gigs; but which practice is likely, under some circumstances, to be attended with injurious consequences; and, were it not that the secreting pressure, in general cases, would overcome the tumefaction of the severed end, might prove serious indeed. The *lingual frenum* and its appurtenances would appear to be as full of evils as Pandora's box. Many 'is the time and oft,' that, in the days of my novitiate in human surgery, I have tortured the helpless infant by snipping its *tiny bridle*, because the maternal fluid, swallowed with eagerness, convulsed its little mouth into a 'cluck,' as the sapient mother expressed it. This almost by-gone error will, probably, bring to the recollection of the reader that equally notorious one, even now prevalent,—that the membranous frænum or fold under the tongue of the dog is neither more nor less than a '*worm*,' or a *something, the extraction of which is capable of preventing rabies*: and this we are told in the nineteenth century!!! *Credat Judæus.*



the mouth, on the inner surface of the lips, and are small secreting salivary bodies. The *molar glands* are found on each side of the mouth, near the alveolar edges, and are also of the same kind, whose excreting ducts open near the last molar teeth. *Folliculose* and *mucous glands* are distributed over these parts, as already noticed; forming the whole of the membrane of the nose, mouth, pharynx, and larynx, into one vast secreting surface, designed to form a mucus, which defends these parts from the external atmosphere, and serves to keep up the sensibility of their surfaces. It is the inflammation of this membrane which forms catarrh, in which case this secretion is seen to be at first increased and thinner, but gradually to degenerate into a thicker and more purulent state. There are also the *lymphatic glands* common to the head, which are principally the *maxillary;* these are situated in the channel towards the superior part of the branches of the posterior jaw, but slightly buried below the skin. It is from the morbid appearances exhibited by them that a diagnosis is frequently formed in glanders. The lymph received by them is carried to the cervical glands. The *muscles of the head* will be found with those of the neck.

The uses of the salivary secretion appear to be to fluidify the food, thereby enabling such as is dry to be more readily swallowed. It has, however, functional properties of other kinds, and contains, without doubt, *living principles* of action, as well as mechanical: by resolving the matters taken in into their principles, it commences the work of chymification and digestion. At all times it is useful, likewise, by moistening the mouth and fauces, thereby keeping them in a constant state of susceptibility. From some experiments made, it would appear that the quantity of saliva furnished by the parotid ducts during the process of eating is more than a pint per hour[*]. As will be seen in the progress of the Work, the salivary glands are liable to disease, of which the strangles is the most prominent instance. To this sometimes succeeds a much worse affection, which is that of a fistulous opening in the duct of the gland. (See *Veterinary Surgery.)*

DESCRIPTION OF PLATE III.

This Plate represents a section of the head, as far as the second cervical vertebra. The section was not carried exactly through the centre, but was inclined to the right side; consequently the left portion is rather the largest, by which the septa dividing the parts are preserved.

FIGURE THE FIRST

Presents the left portion of the section, in which the cartilaginous partition of the two nasal cavities is entire, with part of the falx or septum dividing the two lobes of the brain likewise. The œsophagus, as inclining naturally rather to the left side, appears, therefore, whole in this section.

a, The cerebrum, *b*, the cerebellum, with its arborescent appearance; *c*, *c*, the medulla oblongata. The anterior *c*, shews its origin at the base of the cerebrum and cerebellum: the posterior *c*, depicts the spinal marrow, passing out at the great foramen in the occipital bone; *d*, the eustachian cavity, its membranous septum being removed, to shew the cavity more completely; the letter *d*, is immediately upon a part of the os hyoides; the two vessels that run under and across it are the carotid artery and jugular vein: posterior to it, is a muscle of the os hyoides; next to it, the lingual nerve; and behind these, are branches of the external carotid; *e*, the frontal sinuses divided by their partition, part of which is broken off, to shew the left of these cavities; *f*, the ethmoidal sinuses; *g*, the sphenoidal sinus; *h*, the septum narium; *i*, the vomer implanted below, into the groove of the palatine bones, and above, fixed into the septum of the nose; *k*, the cartilaginous substance immediately over the palatine bones, assisting in the division of these cavities and their formation; *l*, the palate, or roof of the mouth, with its folds or rugæ; *m*, shews the section of the posterior jaw, at the symphysis of the chin: above and below the muscular substance of the lips is seen with the integuments as a line over it; *n*, the section of the tongue, with its greater intermixture of tendinous fibres towards the root; *o*, its outer covering formed of epidermis, or skin, expressed by a white line around its edge; its papillary eminences, greater near the base, are expressed in the figure; *p*, is intended to shew the velum palati, or curtain of the palate attached to the edge of the palatine bone, and extending down in front of the epiglottis; *q*, the epiglottis, or cartilage; *r*, the larynx; *s*, the aretenoid cartilage, or commencement of the trachea; *t t*, with its cartilaginous rings; *u u*, the pharynx, or cavity of the hinder mouth, divided by the curtain of the palate: the pharynx receives the left nostril at the anterior letter *u*; *v*, the internal cuticular coat of the œsophagus; *x*, the muscular coat of the œsophagus; *y*, the cervical ligament, attached to the occipital bone, but escaping the first vertebra; *z*, the cervical hollow maintained for the enlargement of the œsophagus in swallowing.

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[*] 'Si après avoir fait jeûner un cheval deux à deux jours et demi, l'on découvre les deux canaux parotidiens que l'on a soin d'isoler; pendant le temps que l'animal-mangera environ une demi botte ordinaire de foire, l'on peut obtenir jusqu'à dix libres d'une salive claire, blanche, mais tres peu visqueuse; cette expérience réiterée sur des vieux *chevaux* m'a donné presque toujours les même résultats.

FIGURE THE SECOND

Represents the right half of the head, with the velum palati and the membranous pharynx removed, as well as the brain and spinal marrow; *a*, the cavity for the lodgment of the cerebrum, with its risings and depressions marked; *b*, the cavity within the occipital bone, for the lodgment of the cerebellum; *c*, marks the passage through the occipital foramen and atlas; *d*, the frontal sinuses exposed, the bony septum dividing the right from the left remaining with the right portion, but within are seen bony pillars supporting these sinuses; *e*, the superior turbinated bone forming the upper cornet of the nose; *f*, the inferior turbinated bone forming the under or posterior cornet of the nose; *g*, the ethmoidal sinuses; *h*, the sphenoidal sinuses; *i i*, the os hyoides; the superior letter expresses its larger branches, as the lower does its lesser appendicular portions: the bottom portion is its fork or lesser appendicle, and embraces the upper border of the thyroid cartilage; *k*, a branch of the carotid going to the base of the skull: next to it is seen part of the jugular returning the blood from the sinuses; *l*, the carotid artery forming its divisions; *m m m*, the digastric muscle, with its two fleshy attachments and intermediate tendon; *n n n*, the right maxillary gland: the posterior letter shews its body which lies within, and under the parotid, as seen in Plate IV: the middle *n*, shews its duct passing at the posterior, and under part of the tongue; and the anterior letter shews the termination of this duct in the mouth under the tongue, a little distance from the incisive teeth or nippers; *o*, the submaxillary artery, which forms the most convenient part for feeling the pulse, the fingers being applied exactly where the letter is placed; *p*, the left half of the tongue; *q*, its root dissected from its attachment to the os hyoides; *r*, a probe shewing the passage of some of the vessels of the brain; *s*, the optic foramen of the sphenoid bone; *t*, another foramen permitting the passage of the cerebral vessels; *v v*, the most anterior of these, shews the exit of the olfactory nerves, and the posterior the transverse septum, dividing the cerebrum from the cerebellum; *w*, is intended to shew the retraction of the skin of the ear, with the concha, or cartilage of that organ underneath, as it appears in the operation of cropping; *x x*, the parts composing the eustachian cavity and pharynx, as far as the velum palati removed; *y*, the two tables of the skull, with the intermediate cancelli, or diploe; *z* the pericranium lining the skull.

ANATOMY OF THE NECK.

The neck of the horse is a part of considerable extent and much beauty: it assists him in progression, by forming a counterpoise to the great weight and extent of his hinder parts: it is likewise useful in enabling him to reach his food from the ground: to favour description, it may be divided into external and internal parts. Considered exteriorly, the neck extends above, from the pole of the head; and below, from the termination of the channel: it terminates superiorly at the withers, and below at the breast; or, in anatomical language, comprehends all that space between the occipital bone above, and the angle of the posterior jaw below: also to the spinous processes of the first dorsal vertebræ above, and to near the articulation of the humerus with the scapula below. The common integuments of the neck are similar to those of the other parts of the body: the upper margin presents a line of flowing hair, called the mane; and the lower, masses of powerful muscles and indentations formed by the course of the trachea.

Parts of the Neck.

The *cervical ligament*, or *ligamentum colli*, is a very strong substance, of a rope-like form, placed between the head and the body, as a support to the head. The muscles of the neck are very strong: but muscles, if constantly kept in action, tire; Nature has, therefore, given a substance that has great strength, without being liable to fatigue, by which the head remains permanently supported. This substance differs from ligament, in some respects, by being elastic, and thus the motions of the head are much accelerated. It is strongly attached, by its anterior extremity, to the posterior part of the occipital bone; passing over the first cervical vertebra, without attaching itself to it, but being intimately connected with the spinous processes of the second, third, and fourth; the stronger portion of it here passes forward to reach the spinous processes of the dorsal, but it sends down a kind of double lamen of ligament, to unite with the rest of the cervical bones[*]. (See *plate* III.) The *muscles* of the neck operate on the head; and many of the fleshy masses moving the neck, originate on the shoulders: the cervical muscles will therefore be described, together with those of the fore extremities, *en masse*. It will be only remarked of them here, that those situated on the neck have, the greater number of them, connextions with the cervical ligament, and that in surgical operations on it, it should be kept in mind that the direction of their fibres is usually longitudinal. The jugular veins run one on each side of the neck on the outside of the trachea or windpipe, to within a few inches of the angle of the jaw, when a bifurcation takes place into its upper and lower branches. (See *plates* III and IV.) The cutaneous vessels, nerves, and lymphatics of the neck, are described with those respective organs.

Of the *internal parts* of the neck, the seven cervical vertebræ have been described with the Osteology. The cervical portion of this bony chain has its first three links within the upper parts of the neck; the remainder gradually gain the middle portion; and the space between is filled up by the cervical ligament and muscles. Within the bodies of the cervical vertebræ is found the medulla spinalis: and through foramina in their transverse processes creep the vertebral vessels, more deeply seated than the jugulars; and in the vicinity of both the trachea and œsophagus pass the carotid arteries, the par vagas, recurrent, and sympathetic nerves. (See *plate* III, *b*, *fig.* 2.) The *cervical cavity* is intended to characterise a hollow, but seldom noticed, in the region of the œsophagus, purposely left to admit of its distention in deglutition. (See *z*, *fig.* 1, *plate* III.) The *trachea*, or *windpipe*, is a large canal which arises from the cricoid cartilage of the larynx, and extends down the anterior part of the neck into the thorax, between the duplicatures of the mediastinum: it is composed of upwards of fifty annular cartilages, which taper from their front into mere slips, having their terminal points unat-

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[*] There is much to be admired in the construction and application of this substance. It purposely departs from the usual character of ligaments, which are essentially inelastic: this, on the contrary, 'will yield to a force impressed upon it, and it will resume its natural dimensions when that force is removed.' The horse's head is depressed by means of muscles, but which tire by exertion; and thus the grazing horse elevates his head frequently to relieve them: but he is able to stand for hours without *lowering* his head, because it is supported by this elastic suspender, which is incapable of fatigue.—Much interesting matter on this subject may be met with in No. 3 of the Farmers' Series, *Library of Useful Knowledge*.

tached except by the tracheal membrane, but connected by their edges to each other by strong ligaments: thus rendering the trachea perfectly flexible, yet permanently tubular. Externally it is united to the surrounding parts by cellular substances; internally it is lined by a very vascular mucous membrane, the secretion of which defends it against the irritating effects of varieties in the temperature of the air. About the third or fourth dorsal vertebra, it divides into two branches or bronchiæ, the principal divisions of which, at first segmental, become annular, in such manner that their ultimate ramifications, as the lungs collapse, readily pass within one another. (See *t t. fig.* 1, *plate* III.)

The *œsophagus* is the contracted tubular continuation of the funnel-like cavity of the pharynx. Structurally partly membranous and partly muscular, it directs its course between the carotid arteries, inclining a little to the left side, and then penetrates the chest between the layers of the mediastinum, and passes along the dorsal vertebræ, through an opening in the diaphragm, to terminate in the stomach. Its *coats* are, first, a slight and cellular one, which it retains while in the neck, but which in the chest gives place to a covering from the duplicature of the mediastinum. Its second coat is muscular, and made up of two strata of fibres, an external longitudinal and an internal circular. The inner coat is cuticular and wrinkled into folds, that it may adapt itself to the muscular expansion in deglutition: this cuticular portion extends over one-half of the stomach. (See *x, x, y, fig.* 1, *plate* III.)

The Cavity of the Thorax generally.

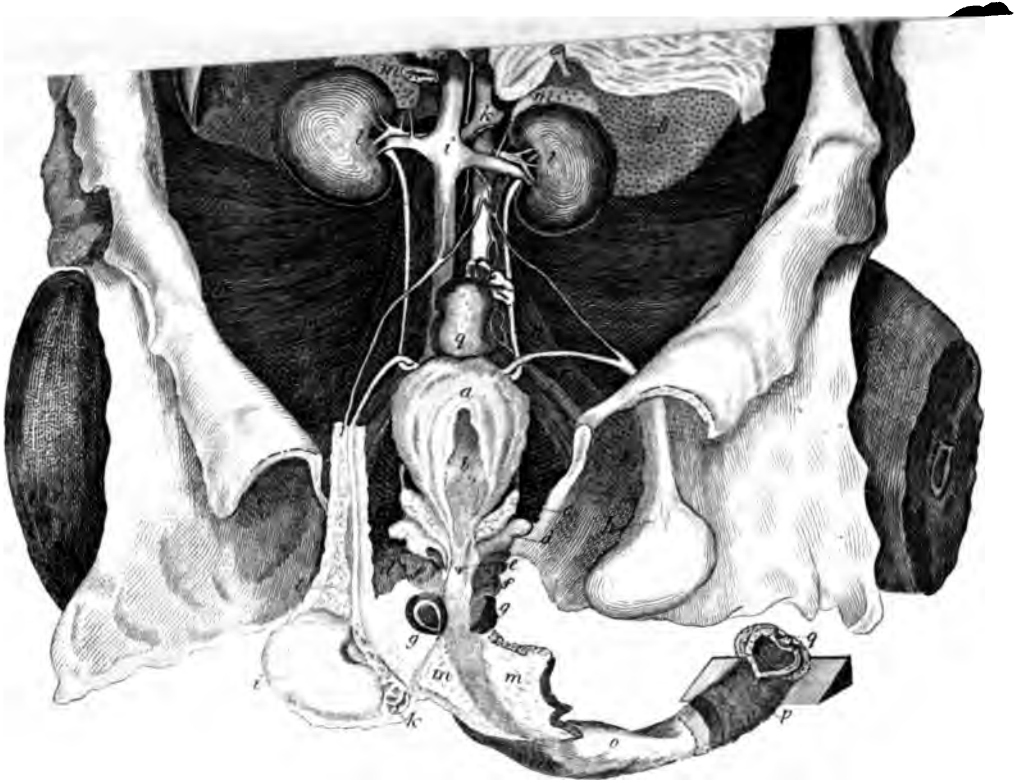
The second great cavity of the body is termed *thorax*, or *chest*. It is bounded anteriorly by the vessels filling up the opening between the two first ribs: posteriorly by the diaphragm; and laterally by the ribs; above by the vertebræ, and below by the sternum. Its external parts are, the integuments, muscles, and bones: its internal, the pleuræ and mediastinum, the thymus gland, lungs, heart, vessels, and nerves, with the diaphragm. The integuments are common to those of other parts: the muscles will be hereafter noticed; and the bony portions, as vertebræ, costæ, and sternum, have been already described.

DESCRIPTION OF PLATE IV.

The viscera of the chest and belly of a horse, and such other parts as come readily into view, when the subject is laid on its back, and elevated before, to meet the sight, are here represented. The skin is raised and thrown back; the cutaneous muscle is removed from the neck; and the sternum has been removed, with the pericardium, mediastinum, and pleura; by which the lungs, heart, and principal vessels, are brought into view, as well as the course of the thoracic duct. The view represents the abdominal cavity cut open through its whole length, and the symphysis pubis divided, to shew the contents of the pelvis. An *entire* male subject was purposely chosen, as exposing parts more frequently engaging veterinary operations. The intestines have been removed, dividing them below the entrance of the biliary and pancreatic ducts, about a foot before the termination of the rectum; and are the only parts displaced, the remaining viscera appearing in their natural situation. The stomach only is slightly distended, to give an accurate idea of its form, but not to its full extent, that the neighbouring viscera might not be hid.

PARTS OF THE HEAD, NECK, AND CHEST.

a, the masseter muscle, upon the upper part of which is seen spread a branch of the fifth pair of nerves; above, its attachment to the spine of the maxillary bone has been raised to bring *b*, the temporal artery and vein, into view, which are seen above the nerve, and are distributed principally to the masseter, but contribute nothing to the support of the eye, and consequently the division of this vessel in the horse does not *immediately*



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abstract blood from the eye; *c*, the anterior cartilage of the ear; *d*, the submaxillary artery and vein, and the duct of the parotid gland. The middle vessel is the parotid duct, piercing the molar muscles, and entering the mouth a little above the second and third molar teeth; *e*, *e*, the upper and lower portions of the parotid gland: its duct is rather brought forward, from the tuberosity of the jaw; it is, however, nearly *in situ*, traversing the front of the gland; *f*, the superior division of the jugular; *g*, its inferior division; *h*, the anterior vena cava formed of these jugular branches, with the axillaries; *k*, the aorta, with its division into anterior and posterior; the anterior goes upwards and forwards, and the posterior becomes lost in the view behind the heart; *l*, *l*, the axillary arteries; *m*, the united trunk of the carotids arising from the right axillary artery, and dividing into the right and left carotids; *n*, the entrance of the thoracic duct into the left jugular; *o*, *o*, *o*, the lobes of the lungs: on the right side is seen a small lobe with a larger one; the lesser lobules do not appear; *p*, the right or anterior ventricle; *q*, the left or posterior ventricle; *r*, the right auricle, from which the two venæ cavæ arise; *s*, the left auricle; *t*, the pulmonary artery, dividing into a right and left; the left is seen to pass under the posterior division of the aorta, at which part is situated the canalis arteriosus; *u*, the posterior cava; *v*, the posterior aorta; between which are seen, to the right, the vena azygos, and, to the left, the thoracic duct.

VISCERA OF THE ABDOMEN.

a, *a*, the diaphragm. The middle and lighter portion, to which the ligament of the liver is attached, is the tendinous part; and the light portions round the circumference are likewise tendinous intersections; *b*, *b*, the lobes of the liver; *c*, the biliary duct arising at once from the liver, without any gall-bladder as in other animals; *d*, the stomach with the omentum attached, and vessels ramifying on it; *e*, its pyloric orifice, ending in the duodenum, into which are seen entering the biliary and pancreatic ducts; *f*, the pancreas, the remaining portion lies under the omentum, *g*, the diminutive size of which in the horse should not escape observation: a portion of it in the view is kept up by a pin stuck into the spleen, to shew that viscus; *h*, the spleen, with its granulated appearance; *i*, the posterior cava forming the emulgent veins; *k*, the posterior aorta giving off the anterior mesenteric trunk, to which the united trunk of the lacteals is attached to gain the receptaculum chyli; but neither does the anterior mesenteric always present itself in this situation, nor do the united trunks of the lacteals always accompany it. Immediately beyond are seen the small emulgent arterial trunks given off; *l*, *l*, the right and left kidney with the emulgent artery and vein, ramifying into each. The left is seen lower than the right, being pressed down by the spleen; *m*, *m*, the glandulæ renales receiving their vessels from the emulgents; *n*, *n*, the ureters seen passing out from the pelvis of the kidneys, and in their course crossing the vasa deferentia; *o*, *o*, the spermatic vessels formed of an artery and vein each: the left spermatic vein is seen arising from the emulgent vein of that side, to avoid a circuitous route, by originating from the cava on the right; *p*, *p*, the lymphatic vessels bringing the lymph from the lower extremities; on the left side they proceed up from the pelvis in company with the iliac vessels and the aorta; *q*, part of the rectum lying immediately behind the bladder; *r*, *r*, the division of the aorta into external and internal iliacs, with the iliac division of the cava also.

THE ORGANS OF GENERATION.

a, the bladder cut open to shew the termination of the ureters within it at *b*. The ureters are seen proceeding from the testicles and crossing the spermatic rope; *c*, *c*, the enlargement of the vasa deferentia before their termination into the urethra alongside of the opening of the vesiculæ seminales; *d*, *d*, the vesiculæ seminales; the right is cut open to shew its opening within the urethra alongside of the vasa deferentia; *e*, marks the termination of the vasa deferentia, and the vesiculæ seminales opening into the same part of the urethra by two little orifices; *f*, *f*, two glandular bodies that correspond in situation, but not in structure, to the human prostates; *g*, *g*, the two antiprostatæ or Cowper's glands, covered with the accelerator muscles: the right is cut open to shew its cavity. The little ducts of these glands, called lacunæ, are seen within the urethra; *h*, *h*, the left testicle, with its rope passing through the ring of the oblique muscle, covered by its vaginal coat and the cremaster muscle, which latter descends along its inner side, and is expanded over its upper part; *i*, the right testicle removed from its passage through the abdominal ring, and its vaginal coat laid open; the body is seen with its vessels ramifying on it, being alternately straight and waved upon its albugineous coat; *k*, that part of the testicle called its appendix or epididymis, communicating with the main body by the tubuli semeniferi, and passing up to form the vas deferens; *l*, the convolutions of the spermatic vessels before they enter the testicles; *m*, *m*, the corpora cavernosa of the penis, with its muscular fibres intermixed: between the two, lies the urethra, the muscular fibres of which are seen running in the direction of that canal; *o*, the body of the penis divested of its outer coverings; *p*, the glans: the dark part shews a portion of the sheath immediately investing it, and thrown into folds to admit of the increase of the dimensions of the organ; *q*, the termination of the urethra by a loose floating extremity, which is fixed in a cavity peculiar to the horse; the outer part of the glans is laid open, to make this more distinct, as well as the internal structure of the glans itself.

Viscera of the Chest.

The pleuræ and mediastinum.—When the chest is opened, a smooth polished membrane is seen, covering its surface, and investing its contents. Each side of the chest has its particular *pleura*, which is distinct from that of the other by the intervention of cellular membrane. So conjoined, they form the mediastinum, the two lamen of which are strongly attached to the sternum, and compose what is called the inferior mediastinum: from whence separating, they receive between their laminæ the heart and its vessels, and are afterwards reflected over the lungs; which having completely invested, they again unite, and form the superior mediastinum, as it has been called. Near the vertebræ they again separate, one portion passing over the half of the spine on one side, while the other passes over the remaining half of the spine on the other side, to line the whole cavity of the chest. By this division a tubular opening is formed, in which are situated the thymus gland, aorta, vena cava, vena azygos, ductus thoracicus, and œsophagus: and by this, two pleural reflections are formed on each side; one connected to the surface of the chest, the other to the surface of the lungs, exhibiting a distinct cavity for each lung, in which is contained a small quantity of fluid, termed *liquor pleuræ*, the diseased increase of which forms hydrothorax. The pleural surface, that comes into view on opening the chest, whether of the lungs or of the chest itself, is smooth, that it may facilitate the sliding of these parts over each other, which the healthy serous secretion from the surfaces further facilitates; but the attached pleural surface is rough and fibrous, to hold the parts together.—The *mediastinum* is, therefore, nothing more than the duplicature of the two pleuræ, which divides the chest into two nearly equal portions: the right being rather the largest, in consequence of the situation of the heart, but the difference in capacity is not so great in the horse as in the human. This complete division of the cavity is of great importance to the animal; for should the chest become penetrated, if total collapse of the lungs were to take place, death must ensue; but life can be carried on by one lung, when an injury to the other has rendered it useless. By this wise provision, ulceration also sometimes confines its effects to one side of the thorax only, and the animal becomes supported finally by the other. That portion of the pleura which lines the bony cavity of the chest, is termed the costal pleura, while the reflected portion receives the name of pulmonary pleura; and which distinctions are necessary to be kept in mind, both in the surgery and pathology connected with these parts. These membranous investments are supplied with blood by the intercostal arteries, and they return it by intercostal veins. The nerves of these parts are also branches from the intercostal nervous trunks; but they are small, and therefore, except under inflammation, the sensibility of the pleura is not great. The *thymus* is a spongy, irregularly formed, and apparently glandular body, placed anteriorly, between the duplicatures of the mediastinum, contiguous to the sternum and to the aorta, and vena cava, at their division. In the colt its size is considerable, and at this time it is said to contain a small portion of whitish fluid. As the animal advances in age, it lessens, its colour changes, and at last it is scarcely discernible. No excretory duct has ever been discovered in it, and neither in the horse nor the human is its use known*.

The *diaphragm* or *midriff* is a most important muscle†, and, like the heart, is in constant action during life. It is a broad, thin, tendinous, and fleshy expansion, and is so situated as to form a complete septum or division between the thorax and abdomen, but an oblique one; for its upper part, opposed to the back, extends considerably farther towards the lumbar vertebræ, while the anterior part is attached to the sternum. In a state of rest, it is anteriorly convex, and posteriorly concave; that surface opposed to the thorax being covered by the pleura, and that towards the abdomen by the peritoneum. From some peculiarities in the disposition of its fibres, it is sometimes described as two muscles; the great and little diaphragm. The anterior or larger portion arises by distinct tendinous fleshy fibres from the ensiform cartilage, from the internal surface of the cartilages of the eighth, and all the remaining ribs, except the two last, by portions which admit of small tendinous digitations between them (see *plate* IV). From these origins, the fibres are directed like radii from the circumference of a circle to a tendinous centre, which is perforated by a dextrally inclined triangular hole, a little inferiorly to the spine, furnishing a passage for the vena cava.—The superior, posterior, and lesser portion of the diaphragm fills up the space left by the larger; arising by different portions from the first, second, and third lumbar vertebræ, of which the two central ones are called its *crura* or *pillars;* between which an interval (its *hiatus*) is left for a transit of the aorta, the vena azygos, and thoracic duct. Sinestrally is situated a third opening, formed from the decussation of the fibres of the crura, through which passes the œsophagus.

Vessels and nerves of the diaphragm.—The aorta, in its passage between the crura, usually gives a branch or two to this muscle; besides which, it receives other rami from the arteries of the chest. (See *Arteries.*) Its veins, which are much larger than its arteries, to obviate the effects of pressure during its motions, finally pour their contents into the vena cava. The phrenic nerves arise from filaments given from the fourth, fifth, sixth, and seventh cervicals: other small branches are likewise given off from the surrounding ganglia and from the great sympathetics, which, uniting with it, tend to *compound its action*, and to make it an organ of extensive visceral sympathy (see *Neurology*, p. 158), as well as *the principal agent in respiration*‡. The exertions of the horse not unfrequently rupture it, and it is very liable to communicated inflammation from other organs, and occasionally becomes primarily so.

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[*] As the thymus gland in dogs is large, and the thyroid small; and as it usually happens, that when one is considerable, the other is the reverse; so we may reasonably suppose that their use is the same. It is the *sweetbread* of the calf, and, according to La Fosse, is sometimes fatally diseased in them.

[†] Nobilisimus post cor musculus.—*Haller.*

[‡] The importance of the diaphragm is not confined to its respiratory agency; but by its great sympathetic connexions, it can act at one time as an assistant, and at another as an antagonist, in various functional capacities. In contracting the dimensions of the chest to expirate, it then acts in direct opposition to the abdominal muscles. In enlarging the capacity of the chest, it becomes a direct aid to the abdominal muscles in many of their actions, particularly in the expulsion of the fæces and urine, as well as in the act of parturition. In quadrupeds prone to vomition, it is an important agent; but I am disposed to think its assistance is not great in rumination.

The Heart.

The *pericardium* is a membranous sac surrounding the heart, attached by its outer surface to the mediastinum, between the duplicatures of which it is situated: its inner surface is contiguous but not continuous to the heart, for there is a fine fluid, the liquor pericardii, interposed. It appears composed of two laminæ, and is attached above to the vessels, over which it is reflected, giving them a covering, and passing down to the sternum; but is not, as in the human, attached to the diaphragm; for the horizontal position of the animal alters in some measure the position of the heart. Its inner surface secretes a very fine fluid, called *liquor pericardii*, which thus preserves a freedom of motion between the heart and sac: in health this is about an ounce in quantity; but when it becomes much increased beyond this, it constitutes dropsy of the pericardium; which is, however, not a frequent disease in the horse.

The *heart.*—This important organ appears a composition of muscular fibres combined with membranous matter, to form a conoidal body with four principal cavities, and several openings, common and proper. Invested by its sac, it is situated obliquely and rather sinestrally, its base being on a line with the dorsal vertebræ, and its apex, which is slightly curved, directed to the left of the sternum between the eighth and ninth ribs. It presents four cavities, two inferior or ventricles, and two superior or auricles. Each ventricle opens by two orifices, one of which communicates with the auricles; the other forms the mouth of a large artery, and the septum divides the two. The right ventricle opens into the right auricle and into the pulmonary artery; the left into the left auricle and into the aorta; at the edges of which orifices there are valves. The *right* or *anterior ventricle* is thicker than the left; its sides are strengthened by fleshy pillars, called *carneæ columnæ*, and also by *tendinous cords* attached to the valves of the auricle and ventricle, by which the mechanism of these parts is greatly strengthened. The *left* or *posterior ventricle*, although altogether longer than the right, is, nevertheless, less dense and capacious. The auricles may be considered as appendages to the base of the heart, and separated from each other by a septum, though externally they appear but one cavity, with indented edges. The *right and larger auricle* is irregularly rounded, and has two openings, an anterior and posterior, which receive the anterior and posterior vena cava. The *left auricle* is considerably more muscular than the right, though its size is less: it receives the pulmonary veins, and it has a common opening with the ventricle. The substance of the auricles is both membranous and muscular, and they are also furnished with a few tendinous and fleshy cords to strengthen them. The *valves* are strong membranous appendages to the ventricles, which prevent the blood from passing but in one direction: those of the arterial openings being called *semilunar;* and those of the auricular, *tricuspid;* as the auricular valve of the left ventricle is known as the *mitral**. The heart is furnished with blood for its own individual support by the coronary arteries, which is returned by the coronary veins. Its nerves are gained from the cardiac plexus and rami of communication derived from the par vagas and sympathetic nerves.

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* The valves act by means of folds of their inner membrane, opposed to the entrance of the blood, but permitting its exit by a separation of their sides; thus, as either ventricle contracts, the blood is driven into the artery, which communicates with that ventricle: the sides of the cavity being brought nearer to each other, the valves close the opening into the auricle, and the artery, being the only remaining passage, receives the blood. The heart after this contraction becomes again relaxed, and the valves of the auricle being drawn downwards, the blood is poured by the veins into its recipient cavities.

The Physiology of the Action of the Heart, as the grand Agent in the Circulation of the Blood.

The *circulatory round of the blood* is a vital action performed by the heart, the description of which I shall prosecute by the ordinary method of dividing it into the pulmonary[*] and general; or, as they are sometimes called, the lesser and greater circulations.

The *lesser*, or *pulmonary circulation.*—The blood of the two cavas, being poured into the right or pulmonic auricle, irritates that sac to contract, by which the valves of the correspondent ventricle are forced close to its sides, and the blood rushes into the cavity; which being stimulated to contract on it, shuts up the tricuspid valves which had permitted its entry. The contained blood, therefore, now seeks another course: and the same action that shut the ventricle, opens the pulmonary artery, by pressing the edges of its valves towards its sides, and leaving its cavity extended, into which the blood, by the contraction of the ventricle, is now forced. The blood thus received into the pulmonary artery proceeds to be circulated through the lungs, and, when returned by the pulmonary veins, to be emptied into the left or posterior auricle; which, having received it, becomes likewise stimulated to contract, in its turn also, and the fluid then is forced into the left ventricle. Thus much of the motion of the blood is termed the pulmonary, or minor circulation, and so much appears to have been known to many of the ancients.

The *greater*, or *general circulation.*—We have traced the blood into the left ventricle, from which it is prevented returning again into the left auricle, by the closing of the mitral valves. The reciprocal contraction of the left ventricle drives the contained blood in the direction of its axis, against the valves of the aorta: which dilating, allow the passage of the fluid into this vessel, from whence it is distributed by divisions to every part of the body, to furnish it with nutritious principles. The remainder being put into a retrograde course, by means of the veins, is again poured from the trunks of the anterior and posterior cavas, into the right auricle; and thus a complete round of sanguineous circulation is formed. It appears that the contraction of the two ventricles is synchronous, and that at the same time that the blood is driven from the left ventricle into the aorta, the right ventricle impels it into the pulmonary artery: and as the period at which the left auricle receives the pulmonary blood is the same with that in which the right auricle receives the blood of the cavas, so it will be evident that the relaxation of the ventricles and the distention of the auricles are synchronical also. These alternate contractions and dilatations of the heart are called its *systole* and *diastole.* The contraction, or its systole, pressing the blood into the arteries, distends them: when, uniting to the force of the heart a contractile power of their own, the blood is propelled through the body. It follows, therefore, that when the heart is in a state of contraction, or systole, the arteries are in a state of distention, or diastole: and it is at this period we feel what is termed their *pulsation.* (See *Pulse*, p. 129.) Thus it will appear, that the two nominal circulations form but one direct round of transmission of the blood through the body of the horse; and which course is universally kept up, except in a few instances, where the economy requires some speciality of deviation; as in its passage through the liver, in the corpora cavernosa of the penis, and in the cavernous sinuses of the dura mater.

The *physiology of the heart*, as the exciting cause of circulation, or the means by which it is enabled thus to act on its contents with such regularity through life, has been a constant subject of physiological inquiry. Suffice it here to state, that other functional phenomena, evidently derived from nervous influence, I think are satisfactory proofs that we are also to look to this agency for the contractility of the vascular system at large[†]; probably assisted by an inherent stimulus in the contained fluid.

The *diseases of the heart* are not numerous in the horse. Carditis, or idiopathic, inflammation of its substance, is by no means frequent, but now and then it does occur: the pericardium is very often seen secondarily affected by pneumonia, and hydrops pericardii has followed. The valves and even the substance of the heart have ossified[*]; its substance has also become ruptured by great exertion, but the occurence is rare.

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[*] There seems great propriety in denominating the vessels which contain the blood previous to its aeration, *pulmonic*, according to Dr. Barclay.—*Anatomical Nomenclature*, p. 176.

[†] Le Gallois instituted a great number of ingenious experiments, to prove not only that it was by nervous influence that the action of the heart was kept up, but that such influence was directly derived from the *spinal marrow*; and it is clear, that although the substance of its nervous branches is not large, they are most extensively connected with medullary origin. An additional proof of the importance of nervous influence on the vascular system is the well known fact, that the bloodvessels of a palsied limb diminish from the time of its attack; it becomes *colder*, and sometimes mortifies.

The Lungs.

Each side of the cavity of the chest is occupied by soft, spongy, and slightly elastic masses, called lungs, having the heart appended between them. In a state of distention they completely fill the parietes of the thorax, to which their figure is exactly adapted. The lungs have a distinct division into a right and left mass, each of which presents deep fissures, partially dividing its substance into what are called its lobes. These divisions are not always the same in every subject, but in the majority of instances the right and largest lung presents three lobuli, the left two only. As already described, the pleura first lines the thoracic cavity, and is then reflected over the lungs, affording them a dense covering: a second reflection from each lung by a union of its laminæ, forms a septum or complete division of the chest, into two distinct cavities, and thus effectually shuts out all communication between one lung and the other, except by their vessels. The colour of the lungs varies considerably: in the colt they present a lively pinky hue; in the adult horse they are darker, and in very old subjects they have a greyish cast and granulated appearance. Internally they are always dark in colour and spongy in texture, being formed from the ramifications of the bronchia, or air-vessels, and the bloodvessels which accompany them, held together by an intervening cellular substance called the *parenchyma*.

The *bronchiæ* are formed from the bifurcations of the trachea already noticed. (See *plate* IV.) The right and larger branch given to the right lung, quickly divides into three trunks. The left, which is the longer, from the necessity it has to stretch itself under the posterior aorta, usually subdivides into two principal trunks. The cartilages of the larger bronchial tubes are distinct, but in the minuter divisions they seem less so; and in the extreme ramifications this structure is altogether lost. They are lined throughout by the mucous membrane of the larynx and trachea, furnishing a mucous covering, and a serous supply that loads the expired air with moisture, and by which non-perspiring animals, as dogs, &c. pass off that which, in the horse, perspires through the exhalents of the skin. The extreme ramifications of the bronchiæ end in minute cavities or cells[†], over whose surfaces are spread, in capillary tubes of exquisite minuteness, the ultimate ramifications of the pulmonary arteries, whose trunks accompany the bronchial branches side by side. The venal ramifications receive the blood from the surface of the cells which the arterial capillaries had deposited, from whence it is collected and returned to the heart by the pulmonary trunks described in the Angiology. The lungs are themselves supported by appropriate vessels or bronchial arteries whose blood is returned by bronchial veins. (See *Angiology.*) Their nerves are furnished from the cervical ganglions: but except under inflammation, these organs are not endowed with much sensibility. Their lymphatics are very plentifully distributed over them, and have been successfully injected in the horse. *Diseases of the lungs*, both acute and chronic, might, *à priori*, be supposed important, from their great vascularity. The numbers we lose by pneumonia attest the magnitude of the former; as the deteriorating effects of what are called thick wind and broken wind are instances of the latter[*].

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[*] Mr. Henderson possesses a remarkable specimen of ossification of the substance of the heart, in which the right auricle appears completely bony. It is to this tendency to ossific deposit in this organ we owe the vulgar opinion, *that there is a bone in the heart.*

[†] These cells are readily demonstrable to the naked eye in amphibia, and appear disposed to dilate and yield to the stimulus of pressure, since they are said to be considerably enlarged in the pearl divers. It is also very possible that on their varied dimensions, in a great measure, depends the superiority of '*wind*' in some horses over others.

The Physiology of the Lungs in Respiration, and Aeration of the Blood.

Respiration.—The fœtal colt subsists by direct communications between its own organs and the maternal, through the medium of the placenta; and it is by these *secondary* means that its blood becomes aerated; but as soon as separated from the mother, this process is brought about by its own organs alone; and the lungs, hitherto passive, by a sympathetic want are roused into action: the muscles of the chest enlarge the cavity; the air rushes in and distends their cellular substance, and the animal now *breathes*. The distention of the chest is a very important feature in respiration, and is operated by an increase of its several diameters; circumferently by the elevation of the ribs[*], and longitudinally by the agency of the diaphragm: to which, without doubt, we are principally indebted for the general inflation of the lungs. This muscle in a state of rest is convex towards the breast, and concave towards the abdomen; but when its muscular fibres contract, it becomes plane-like, which forcing backwards the abdominal viscera[†], necessarily enlarges the thoracic cavity. The air received into the lungs expands their cells throughout, by which also the blood of the pulmonary vessels find a ready passage through them. The lungs thus filled, an uneasy sensation stimulates them to contract; the diaphragm relaxes, and the abdominal muscles shorten, by which the contents of the abdomen are forced forward: the intercostals cease their expanding action, and the capacity of the chest is diminished; by which the air is expired, or forced out of it. After a momentary pause, the blood becomes collected in the right side of the heart, owing to the resistance it met with in the pulmonary artery, from the collapsed state of the lungs, and causes a plethora in every other part of the body; which enables us to account for the fulness of the vessels of the head, and its consequences, from a tight collar pressing on the trachea in ascending a hill. This accumulation, therefore, renders it necessary for fresh air to be drawn into the lungs; and in this manner the routine of respiration is carried on, the actions, under ordinary circumstances, being repeated about six times per minute. There is, indeed, a certain consent, or proportion, between the action of the heart and that of respiration in the general state of the animal. If more blood be sent to the heart by the stimulus of exercise, &c., the respiration will be also accelerated: thus, in quick motion, or great exertion, there is panting or quick breathing; the air being suddenly ex-

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[*] Few proofs of the morbid effects entailed on horses, by the artificial state of life we subject them to, are so incontestible as these diseases, which are almost unknown among asses; and nearly equally so among the wild, half-reclaimed horses of Asia and America.

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[*] Mr. Percivall questions this *circumferent enlargement*, except on *extraordinary* occasions; but I am disposed to think that a consideration of the matter, either anatomically, analogically, or experimentally, will afford proofs of a *uniform* enlargement of the costal arches under respiration, and that to a greater degree than is generally supposed. The first rib being fixed, becomes a fulcrum to the remainder, whose articulations, though limited, yet in conjunction with the flexibility of their cartilaginous connexions, turns their angles outwards, and elevates the costal arches, when operated on by the contractions of the intercostales, as well as transversalis and levatores costarum muscles; by these means there must be a very considerable enlargement of the transverse diameter of the chest. It would be most analogical to suppose, that these *appropriate* respiratory muscles were given to be called into action on extraordinary occasions only; for such, the chest calls on other muscles as respiratory aids: the serratus magnus, the sternal, humeral, and others, which pass between the ribs and shoulders to operate progression, &c. &c. are of this kind. It is thus that, when violent exercise has, what is termed, 'blown' a horse, he severs his fore legs (as we elevate and extend our arms when we wish to take a more than ordinarily deep inspiration to yawn), inclines them forward, and depresses his head, that he may firmly fix these parts, and make them act as fulcri to the thoracic extremity of the assistant muscles in expanding his chest: and how grateful an assistant it is at this moment to loosen his girths every humane fox-hunter is well aware. It is principally to the pleural connexion of the intercostal muscles that pleurisy in the horse is observed more acutely painful than pneumonia: it disturbs the circular expansion more.

[†] This displacement of the abdominal contents is marked by an elevation posteriorly, or what is known as the *'heaving of the flanks:'* this action, therefore, becomes a usual criteron both of the celerity and state of respiration: for when the elevation is excessive, it shews that the diaphragm is put into more than ordinary requisition to relieve the intercostal muscles from the effect of the circumferent distention: and which is particularly observed in inflammations of the viscera of the chest.

pelled, and as quickly inspired, that no obstacle may be offered to the passage of the blood. This becomes also necessary on another account; for, as the force of the respiratory muscles, particularly the auxiliary ones, must be diminished when other muscles are in strong action, what is wanting in strength, therefore, is made up in celerity; the auxiliary muscles in these cases being able to act but little, as their fixed points must be the chest, and their moveable ones the extremities.

The Nature and Properties of the Blood.

The nature and properties of this fluid belong to the section on Hygrology; but its intimate physiological connexion with the parts just described makes it more proper to consider it in this place. The blood was, in the earliest ages, peculiarly venerated, and it always stood high in the estimate of animal parts: perhaps, the great stress laid upon it in the Bible has not a little contributed to continue an opinion of its importance, seeing that in it men were strictly commanded to 'refrain from blood,' because '*it was the life.*' This sentiment is so generally diffused, that, by common consent, it is called *the vital fluid;* and the gaudiest flowers of rhetoric have been expended on imagery flowing from this general opinion. The immortal Harvey left its course through the body as a legacy to the physiologists of our times: to the illustrious John Hunter we are indebted for much of our knowledge of its physical and chemical properties, and particularly of its agencies in the living systems, of which its makes so important and so considerable a part. In essential characters and properties, blood is the same in all animals: in some, it wants the colouring matter*, but it is invariably *red* in the higher orders, though the intensity of its hue varies with circumstances, the principal instance of which is that afforded between the venous and arterial; where it is, in the former, almost purple, but in the latter, a bright scarlet.—The *specific gravity* of the blood is very differently estimated, it being subject to increase and decrease at different times. Disease and emaciation make it lighter, while in the contrary states, from its more perfect organization, it is found heavier. If water be estimated at 1000, the specific gravity of blood may be reckoned at 1050; from which it may, however, be increased to 1120. Venous blood is heavier that arterial, as 1052 is to 1049; but, as before observed, these data vary.—The *temperature* of the blood in the horse is about 100; in the ox, 102; and in the sheep, 103: but various circumstances tend to increase or decrease it. Arterial blood is usually one or two degrees warmer than venous: Mr. Vines, I believe, rates the difference much higher. Some diseases reduce the heat of the blood, and ardent inflammations are also capable of augmenting it. The *quantity* that an animal contains, in proportion to his bulk, has been endeavoured to be ascertained: but the results have been various. Very fat animals are found usually to have proportionably less than lean ones; and in those in a state of close confinement, the quantity is found to be smaller than in the wild; but it is evident that, as the calculation must be in a degree imaginary, from that which will remain in the vessels, so the real quantity is not easy to estimate. A medium sized horse has lost forty-four pounds without apparent injury, and most of them will lose one-fifteenth of their total weight before life becomes extinct: it may, therefore, be presumed that it forms one-tenth of the whole: Mr. Percivall thinks one-eighth.—The *chemical properties* of the blood are important subjects to the medical student. It appears to be variously compounded, but is most distinctly separable into two parts; the one solid and red; the other fluid and slightly tinged with yellow, or, as otherwise expressed, divisible into crassamentum[*] and serum[†]. The process which separates them is termed *coagulation*.

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* It is red in man, and all the mammalia, but less intensely so in the horse than in many other quadrupeds; among which it also varies, it being deeper in the hare than the rabbit: neither is it alike in the same animal at different times and under different circumstances: thus permanency of colour is not essential to its vital properties; so little so, that it is limpid in some of the most important parts of the body, as in the eye of the horse. It is also universally so in various tribes; being white in some of the crustacea, as the lobster and shrimp; and green among insects, as the grasshopper and white caterpillar.

[*] The *coagulum*, *cruor*, or *crassamentum*, is found to be composed of two parts: that to which it owes its colour is called its *red globules*, although the form of the particles has been a subject of infinite dispute; the other component, and that which gives consistence and adherence to the red particles, is known by the names of coagulable lymph, fibrin, and gluten. As some animals have no *red particles* in their blood, and as others are only partially supplied with them, as fishes, insects, &c., it has been supposed that they were the least important portions of the blood. Mr. Hunter, however, considers them as greatly connected with the strength of the organs, as he observed that the parts subjected to the greatest exertions, as muscles, were fullest of them, and that in proportion as muscles are more or less highly coloured by them, so have they proved stronger or weaker. From known facts, one would infer that the red globules are longer in forming than the other parts[*].

[†] The *fibrin*, as it is now more generally called (though until lately better known as *coagulable lymph*), forms the other portion of the clot, and appears to be the most important part of the vital fluid, and is present in every animal. It appears to have undergone the most complete animalization of all the other parts, and is mechanically, but intimately, mixed with them. After the perfect abstraction of the serum and red particles by maceration, it will be left nearly limpid, firm, tough, and fibrous, bearing in its general aspect, as well as chemical characters, a close resemblance to muscular fibre when deprived of its connecting membranes and colouring matter. It appears to be that part of which all the solids of the body are immediately framed: it forms the callus of bones, and can become organized whenever extravasated, either by its own specific action, or by the action of the solids upon it. It readily coagulates, is soluble in alkalies but insoluble in water, oils, or ardent spirits, and yields salts by incineration. The *coagulation* of the fibrin is a very important feature in the character of the blood; and, as seen below, has been used in advancing the doctrine of the *vitality of the blood*; from this property are also gained *appearances*, which have been considered practically connected with the treatment of disease[†].

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[*] When blood is abstracted, the general bulk appears to be very quickly reinstated; and this occurs although the quantity be considerable and often repeated. A lady who was bled every other day (when phlebotomy was a fashionable practice in phthisis), though not so much reduced by it as might have been expected, yet gradually exhibited the curious spectacle of almost *colourless* blood. Butchers are in the habit of daily bleeding their calves, to render their veal *white*: if the colourless parts were not more quickly restored than the red, rapid absorption would take place, and the loss of weight in the animal would soon stop the practice.

[†] "From coagulation," observes a favourer of the Hunterian principles, "arises the formation of what is termed the 'buffy coat,' an appearance in the blood which denotes inflammatory action in the system, and the presence of which affords an invaluable guide in the treatment of disease. The terms 'buff,' or 'size,' are employed to denote that state of the crassamentum when its upper part contains no red particles, but exhibits a layer of buff-coloured substance, lying on the top of the red clot. In this condition of the blood the red particles sink to the lower part of the clot before the coagulation is completed, and, therefore, the upper surface of the clot is colourless; at the same time, *the whole of the coagulated portion is much firmer than natural.* The red particles have time to subside before the coagulation is complete, because the coagulation is *slower*; and it is slower, because in the morbid condition of the system, of which this buffy appearance is the sign, the blood possesses *a higher degree of vitality than it does in a sound state.*" This condition of the blood having been long considered as indicative of an inflammatory state of the vessels, is, among practitioners, carefully sought after; and if it really be as above stated, it becomes of great importance to inquire what accidental circumstances tend to hasten or retard the coagulation of the blood, that we may not be led to form a wrong prognosis from its appearance. It is found that detaching it from the body *quickly* by *a large orifice*, and receiving it into a deep vessel with a narrow bottom, tends to delay it, and consequently to assist the separation of the red particles, and exhibit the buff on the surface of the clot; it is, therefore, very generally recommended, in all acute diseases, to draw the blood in this manner. It is not only that the blood itself may yield a just indication, but there are also *curative intentions* involved in this method of abstracting blood in violent inflammatory affections, and which are supposed to be effected by the sudden check it gives to the circulation; the disgorged vessels being now enabled to contract on their over-distended coats. It may be here remarked, also, that the *cupped* appearance of the coagulum, although denied any existence in the horse, is yet occasionally present, as I have witnessed, and that both in health and disease: Mr. Percivall asserts the same. In fact, I long ago had remarked, that in the horse, as well as in the human, neither the cupped nor the buffy state of the blood were invariable marks of disease; but that, in both subjects, blood abstracted when in health (for both, as is well known, are bled from caprice or

Spontaneous coagulation is not so rapid in the horse as in man, in whom it is completed in seven or eight minutes; whereas it commonly requires more than twenty to *set* the blood of the former.

as a preventive) often exhibited a coat of *size*, as well as that, in some cases of disease: if blood, therefore, were to be drawn until it presented no buffy covering, the last drop might be taken away. In the human subject this appearance is now very generally suspected by observant practitioners, as affording a fallacious and an unsatisfactory criterion of morbidly increased circulation; and, I believe, a similar opinion is making its way in the minds of veterinarians with regard to the buffy state of horse blood also. Mr. Percivall, on this subject, observes: 'That what is regarded as indicative of increased, if not diseased, action in the vascular system of the human subject, is perfectly natural to that of the horse in his domesticated state. If you examine the blood of a horse in apparent good health, you expect to find it *sizy*.' The opinions of Mr. Vines, of the Veterinary College, go much farther than this, and appear to militate altogether against those originally formed by Hunter, in many of the phenomena exhibited by the blood. In several numbers of the *Lancet* are detailed a series of observations on the blood of animals under different states of excitement; and attempts to account for the change which blood undergoes, and the appearances it puts on under disease. But, previously to any detail of these, it may be prudent to glance at those opinions and doctrines to which they stand in opposition, and which doctrines and opinions have formed the ground of many of our physiological as well as pathological data for a considerable period. Mr. Hunter, as is well known, advocated the absolute *vitality* of the blood, and taxed the power of his great mind in support of his theory. The proofs brought forward rested on the phenomena displayed by it; which, he argued, were directly peculiar to and characteristic of the principles of life: as, 1st, its resistance of cold; 2d, its capability of originating motion and action in effused blood ejected on surfaces or poured within cavities; 3d, its capability of dying; 4th, its power of maintaining a constant fluidity while circulating within its vessels; 5th, its property of coagulation when separated from them; on which latter property most stress is laid by himself; and it is on this that his opponents ground their principal arguments of dissent to his doctrines, which they allow formed an assemblage of indisputable facts. But the physical explanation of facts by no means establishes a law; yet into such an error Mr. Hunter seems to have fallen, and his arguments, therefore, when sifted, are said to prove little more than 'that the blood coagulates because it does coagulate.' A strenuous advocate for a principle of life in the blood, speaking of the buffy state as already noticed, thus continues: 'these facts abundantly attest how little the coagulating process is dependent on physical agents; there are also *other* phenomena connected with it, which shew how closely it is related to the actions of life; phenomena which prove that the vitality of the blood increases or diminishes with the vitality of other parts of the body. The blood, when drawn from its vessel, does not instantly die or coagulate. By observing the length of time consumed in the process, we are enabled in some sort to measure the degree of vital energy it possessed. It is found that in diseases which depend on a preternatural energy of vital action, as in inflammation, the blood coagulates much more slowly than in a state of health, while the coagulation itself is more perfect; and, on the contrary, that in diseases which depend on a diminution of the vital energy, as in certain fevers, it either coagulates much more rapidly, or does not coagulate at all; because, in the first case, it possesses the vital principle in a higher degree than natural, and therefore resists longer the influence of the physical agents to which it is exposed; and, in the second case, it possesses the vital principle in a less degree than natural, and therefore sooner yields to the influence of those agents. The experiments of Mr. Thackrah are also cited in proof of the general principles of the vitality of the blood, and particularly of the opinion which considers *that in the morbid state of the system, of which this buffy appearance is the sign, the blood possesses a higher degree of vitality than it does in a sound state*. Mr. Thackrah's experiments consisted in receiving blood taken from the vessels of a living animal, in a full and uninterrupted flow, into different cups, and noting the time at which coagulation commenced in each. For example: blood was taken from a horse at four periods, about a minute and a half being allowed to intervene between the filling of each cup. In the first cup coagulation began in eleven minutes ten seconds; in the second cup, in ten minutes four seconds; in the third cup, in nine minutes thirty-five seconds; in the fourth cup, in three minutes twenty seconds. In another experiment, blood was received from the vessels of a slaughtered ox into three cups; No. 1 being filled in the first flow; No. 2, about three minutes afterwards; No. 3, a short time before the death of the animal. Coagulation commenced in No. 1, in two minutes thirty seconds; in No. 2, in one minute thirty-five seconds; in No. 3, in one minute ten seconds. In a similar experiment, coagulation commenced in the first cup in two minutes ten seconds; in the second, in one minute forty-five seconds; in the third, in thirty-five seconds. Similar phenomena are observed to take place in the human subject.

Having thus stated the Hunterian principles of the blood, we will now contrast them with those above hinted at, as advocated by Mr. Vines. 'It is an established fact,' says this gentleman, 'that the blood puts on a peculiar appearance when an animal is labouring under disease; for when it coagulates it separates into two parts, the superior part being of a yellow colour, which has received the name of lymph or buffy coat, and the inferior of a red colour. We find, however, a similar thing takes place when in health, but this has not yet been accounted for. I have, therefore, been induced to try a great number of experiments, and am now able to prove the following facts. 1, That if from an animal, as, for instance, an ass, being in perfect health, feeding only on hay, and living in the open air at a temperature between 45 and 55 degrees, blood be drawn to the amount of two ounces, it will be found buffy. 2, That if the temperature be increased to beyond 60 degrees, the blood will be wholly red also. 3, That if an animal in health, his blood being buffy, be made to undergo moderate exercise, it will become wholly red, and will continue so for some hours afterwards; but when the circulation becomes tranquil, it will again put on its buffy appearance. 4, That should the exertion be continued to an immoderate degree, the blood becomes again buffy. 5, When the venous blood is buffy, the arterial is so likewise, but in a less degree. In old weak animals, and those suffering from disease, these changes are not so evident. 6, That if a horse or an ass, being in health, and the blood buffy, be destroyed by bleeding from the jugular vein, and the blood be caught in different glass vessels, and allowed to coagulate, on examination it will be found that that which flowed until the animal manifested symptoms of exhaustion from loss of blood, will be buffy; whilst that which flowed after, even until the death of the animal, will exhibit no such appearance. 7, That if from a horse or an ass, being in health, and the blood buffy, blood be drawn from the jugular vein to some amount, and the spinal marrow be divided as near the brain as possible, the arterial blood, the moment respira-

Physiology of the Blood.

The fluid basis of the blood is *serum:* it serves to dilute it, and it forms about four-sevenths of the whole; the proportions being somewhat smaller in the horse than in the human[*]. It is slightly saline, and less putrefactive than the coagulum. It remains fluid in every degree of heat, between 30 and 160 degrees Fahrenheit: with a less heat it freezes; in a greater it coagulates. It appears chemically composed of albumen, gelatin, saline matter, and a considerable quantity of fluid which drains from it, called the *serosity*, which as it exudes from our dressed meat we call *gravy*. Serum appears not only the fluid base of the blood, but it also dilutes all the secretions as well; it is the interstitial fluid of cavities: when morbidly increased, it forms dropsy. The *blood*, therefore, is considered as a compounded fluid made up of these several parts, and which, considered as an aggregate, is a most essential component of the animal. All parts of the body are formed of it; and all parts of the body can be resolved again into it, by means of the absorbents; hence we must conclude that there is a very intimate connexion between the solids and the fluids, from whence Mr. Hunter, and many subsequent physiologists, have been led to consider both as governed by the same laws, and as identified with each other in living properties. For many centuries a morbid condition of the fluids, but particularly a vitiated state of the blood, was considered as the principal cause of disease. This peccant quality in the humours of the body was called the *humoral pathology*, the overthrow of which, begun by Boerhaave, continued by Cullen, and completed by Hunter, has occasioned the different diseased affections to be now rather ascribed to a vitiated action or derangement of the solids than of the fluids; contending, that were the blood specifically affected in diseases, that circulating as it does over the whole body, it must necessarily affect the system *generally*, and not *locally*. The blood, therefore, it is alleged, cannot contain in itself any morbific matter; for if it did, it is argued, inoculation by it ought to produce, in contagious diseases particularly, the same contagion which the introduction of the morbid matter itself would have done. Great as have been the obligations which physiology, pathology, and surgery, owe to the researches of this distinguished character, yet it is now very generally acknowledged that the doctrines he inculcated have been carried too far; and that numerous facts, incontrovertibly proved, convince us, that the fluids of the body, and the blood itself, are not exempted from disease, but are in many instances specifically affected with morbid matter, which is capable, by inoculation or transfusion, of producing its like[†]. Facts also go to prove that putrid matter injected into the blood is capable of producing putrid diseases.

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tion ceases, will become as dark-coloured as venous, and of the same temperature; and if from the same animal blood be taken from the right and left auricles of the heart, and allowed to coagulate, that from the right will be found to possess the buffy coat, whilst that from the left will be entirely red, without the least appearance of buff. 8, That in young healthy animals the buffy coat is nearly white, much resembling coagulated chyle. Mr. Hunter, in his work on the blood, considers the buffy appearance to arise "either from an increase of animal life, or from an increase of a disposition to act with the full powers which the machine is already in possession of." *Hunter on the Blood*, p. 68 and 69, vol. 2.) This I consider cannot be the case, since we find it in horses turned out to straw-yards during the autumn and winter, when the vitals are weak in consequence of a want of proper nourishment, but not in the spring and summer, when they are in full enjoyment of good food. The blood is found to assume this buffy appearance in horses labouring under organic disease, as inflammation of the lungs, &c. The vital power of the animal having been exhausted from some exciting cause, the action of the heart and arterial system is found quicker than usual: some practitioners, therefore, observing the blood then to be of this buffy appearance, consider this as the highest stage of the inflammatory action; the horse is therefore bled and blistered largely, with a view to subdue the disease, but which treatment will tend to exhaust the vital powers. In the latter stages of farcy and glanders, the blood is always buffy, the circulation quick and weak, and the lymphatics of the extremities become distended with fluid: all indicating extreme debility. It appears, therefore, from this, that the blood assumes this white or buffy appearance when the *vital powers are weak*, and the *florid hue* when strong.'

[*] Mons. Girard estimates it at one-half, but which does not agree with my observations on it. Mr. Percivall very justly observes, that the disproportions between the serum of the horse and man are in some instances scarcely observable, but in others they are.

[†] At the Veterinary College, the blood of a glandered horse was transfused into a healthy ass, who in a few days became affected with the same disease, and communicated it to another by inoculation. Transfusion of the blood of a mangy dog has also produced mange in a healthy dog, and numerous other proofs equally convincing might be brought forward to establish the fact, that the fluids, as well as the solids, may be morbidly affected. The grand argument, that the universal presence of blood in every part of the body must necessarily, if such blood became affected, produce general disease throughout that body, and not the local affection of a part, is by no means tenable: for, by laws framed by the Great Architect of the machine, every disease has its particular seat, and almost every poison its preference: mange affects the skin; grease the heels; glanders the mucous membranes of the nose; farcy the superficial absorbents; and the murrain throws out buboes in the cellular membrane.

The Aeration of the Blood.

The blood, in its course through the machine, is constantly encountering *deterioration* and *waste:* the former, in giving warmth to the body; and the latter, in furnishing materials for the support and growth of parts: it therefore becomes necessary that it should have sources by which it may be *meliorated* and *augmented:* these sources we consider to be the lungs, and the chylopoietic viscera. Air is inspired, and air is expired; but that taken in and that ejected are essentially different. The air *inspired* by animals, called atmospheric air, we know to be formed by the union of three aëriform fluids in very different proportions; there being rather more than two-thirds of azotic or nitrogen gas to something less than a third of oxygen: carbonic acid (or, as it used to be called, fixed air) forming the supplementary gas, to the amount of one per cent. only. The *expired* air has lost much of its oxygen, and, instead of it[*], has acquired an accession of carbonic acid nearly equal to its loss of oxygen. It is now unfit for the support of human life; and the measure of its inability is, that it is unfit for combustion also[†]. A question now arises, What is become of the oxygen? Has the blood absorbed it, and has it been conveyed in this state over the machine by means of the arteries, while an equivalent of carbonic acid has escaped from the blood? or does the blood furnish the carbon only, with which the oxygen of the air unites? The former supposition has long been that most generally received; but difficulties to its admission have occurred which have now given a preponderance to the latter opinion. Messrs. Allen and Pepys, after many experiments, could not discover that any portion of the oxygen was absorbed in ordinary respiration; and further results, by Mr. Ellis, would seem to shew also, that the oxygenous portion does actually unite with the excreted carbon of the pulmonary vessels, and thus forms carbonic acid exterior to the lungs, and which is exhaled in the expirations. On the other hand, there yet remain some powerful advocates for pulmonary absorption of the oxygen. The expired air is loaded with moisture; but it is not now supposed that such moisture is produced by the combination of the oxygen with the hydrogen given off by the blood; but that it is a direct serous exhalation from the mucous surfaces of bronchia[‡], by which not only is the blood unloaded of a fæcal portion, but unnecessary heat is disposed of: thus respiration, by its changes, at once gives heat and moderates it; so simple, yet so efficient, are Nature's contrivances.

The colour of the blood is singularly altered by the action of the air received into the lungs; dependent, as experiments lead us to conclude, on its oxygenous portion, and connected with that general salutary alteration which takes place in its change from a venous to an arterial character. It is thus that venal blood exposed to the action of the air soon loses its dark hue, and becomes florid[§]; and hence, also, if the blood within the pulmonary artery be examined, which, as before observed, performs the office of a vein, it will be found dark and venous, while that in the pulmonary vein will be found florid and arterial. That this change of colour arises from the air, we know; for if we strangle an animal, and then open each side of the heart, we shall find the blood in both equally black and venous. A great change takes place in the *density* of the blood likewise by the process of aeration. An experiment made by Dr. Davy on that of a sheep yielded 1051 for the venous and 1049 for the arterial: nearly similar results have followed the examination of the blood of horses and that of oxen also.

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[*] The expired air has, however, not entirely lost its oxygen; for, according to Goodwyn, a quantity of air taken into the lungs at a single inspiration, containing 80 parts of azote, 18 oxygen, and 2 carbonic acid, had its composition altered, after the experiment, into 80 azote, 5 oxygen, and 13 carbonic acid; 2 parts of the whole having disappeared, and 11 parts of carbonic acid having been substituted for 13 parts of oxygen.

[†] It is thus that we let down into a drain, well, or cistern, a lighted candle, previously to venturing into it ourselves; for if the candle will not burn, the air is unfit for respiration, and *vice versâ.* It is thus that air breathed and rebreathed in crowded stables is rendered unwholesome, from the deprivation of its oxygen; which being, as will be shewn, so essential to life, that its total abstraction immediately destroys, renders it reasonable to conclude that a partial abstraction of it sensibly injures the frame, and lessens its energies.

[‡] As we are informed that not less than twenty ounces are exhaled every twenty-four hours from the lungs of an ordinary man, we may suppose that as much as two quarts transpire from the serous surfaces of the bronchia of the horse in the same time. This serous exhalation is generally distributed through the animal economy, and exists in two forms: on the superficial cellular tissue of the body it transpires by a sensible and an insensible perspiration. Some animals principally exhibit the insensible exhalation, as dogs, &c.; in them the sensible or sweat seldom appears; but this fluid evacuation being essentially necessary to them as well as to others, their *bronchial* exhalation is correspondently more considerable; and therefore, instead of a dripping skin, they pant away with open mouth that portion of serosity which the horse sweats off by his cuticle: and thus in both the blood is equally relieved from its accumulation of moisture, and the body from superabundant heat by the evaporation produced. In the words of Richerand, it may be therefore concluded, 'that these two secretions are supplemental to one another: when much water passes off by the pulmonary exhalation, the cutaneous is less, and *vice versâ.*' The thinking veterinarian will observe, in these circumstances, a solution to many phenomena, and may also derive therefrom many practical facts.

[§] As might be supposed, the action of the air on the colour of the blood was originally denied, from the apparent impossibility of its immediate contact through the membranous sides of the bloodvessels; but which difficulty was removed by the acumen of Priestley, whose experiments proved that, under the cover of a surface of bladder, venous blood became as florid as by open exposure. A familiar and conclusive proof of the direct action of the air on the blood may be gained by changing the surfaces of the grumous clot taken from the vessel into which a horse had been bled some hours: the upper surface, whichever it be, will by the application of air soon become florid: change the surfaces, and the

The production of animal heat.—Interesting and important as is the sensible change operated on the blood by its conversion from a dark to a bright hue, there is yet another equally so; and if we take into the account that it operates on animals generally, as well those whose blood is not red, as on those in which it is, it may be deemed of even more *vital* importance. To the veterinarian, few subjects can be more interesting than the exposition of the perennial and independent temperature of animals: and to be enabled to *regulate* animal heat to the preservation of health, to learn how to diminish it in acute or inflammatory affections, or to increase it in chronic or indolent ones, are objects worthy his utmost attention. Any thing beyond the slightest summary of the doctrines or theories by which its phenomena are attempted to be explained would much exceed my confined limits; but the practical inferences to be drawn from the subject are so numerous, that I cannot pass it without some notice, first premising that it behoves the veterinarian to consider every theory hitherto formed on the subject as open to weighty objections. Of the reigning hypotheses, the first is the celebrated one of Dr. Black, materially elucidated by Dr. Crawford; which, pre-supposing the specific heat of oxygen to be greater than that of carbonic acid gas, it follows, that, when the former is converted into the latter in the lungs, a quantity of *latent caloric* must be disengaged*, by which *sensible* heat will be given to the blood; and as that circulates universally through the body, so it imparts warmth throughout the machine. To either our implicit reception or total rejection of this theory, it is necessary to be better acquainted with the relative connexions between the formation of carbonic acid, and the disappearance of oxygen in the lungs, than we are at present: on this Dr. Majendie observes, 'however, as the oxygen very probably combines with the carbon of the blood, and as every formation of this sort is accompanied with a considerable disengagement of caloric, it is also probable that this is the source of the greater part of the heat of the arterial blood.' Notwithstanding this testimony and others equally able, the chemical theory of animal temperature must be considered on the decline, and the arguments brought against it must be acknowledged numerous and important†. Mr.

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effect will be repeated; the upper speedily becoming red, and the under soon acquiring a purple hue. Again, if a large artery be taken up, the blood in it, which was before florid, soon becomes dark: the veins likewise have the dark blood in them rendered still darker, if its course be retarded or stopped; thus on tying up the neck to bleed, the fluid that first issues, particularly if the ligature is tight or has been long applied, is very dark; and it is common to hear it said, 'that such blood is very bad;' but after it has continued to flow, it becomes more bright, as having been less under the suspension, which is then said to arise from the horse 'having parted with his bad blood.' It is likewise usual, when blood trickles down, to see a florid and dark stream; the florid part arising from some of the capillary branches which have not yet been deprived of their oxygen.

* *Caloric* is a term invented to remedy the defect of the ambiguity of the conventional names *heat* and *cold*, which, it is to be remarked, are wholly indefinite, being usually measured by the momentary standard of our feelings only. *Cold* is nothing more than our perception of the absence of the matter of *heat* or *caloric*. Although, therefore, this comparative measure of heat sufficed for the common affairs of life, yet it proved ambiguous in the extreme in philosophical description. *Caloric*, therefore, expresses that universal agent to which matter owes its fluidity; for without it, water is but ice; and all plasticity whatever is destroyed by its absence. Caloric may exist, however, without its being perceptible to our senses in a *latent* state, as is exemplified by friction between two bodies, cold to the touch, which only disengages the latent heat within them, and presenting it as *sensible* heat; i. e. our sensations can take cognizance of it.

† The experiments of MM. Delaroche, Dulong, and Berard, go to prove that the quantity of the matter of heat disengaged by the conversion of oxygen into carbonic acid gas, would be insufficient to heat the residual air that is expelled in breathing to its ordinary elevation; and which, therefore, affords a presumption that it cannot be from this source that the high temperature of the body is formed; neither have the attempts of Dr. Crawford succeeded in removing the argument against this theory, that, were it true, the lungs must necessarily prove hotter than any other part of the body: to which also it may be added, that the various changes which these organs undergo, particularly in some diseases, without corresponding alterations in the temperature of the body, are strong negations; and render it not surprising to hear it observed that some other source of calorification must exist in the blood than its chemical changes. Dr. Elliotson, however, ably advocates the connexion of animal temperature with a chemical action between the blood and air. 'A host of circumstances,' says this ingenious writer, 'shew that our temperature depends upon respiration, and, therefore, upon chemical changes. In high temperatures, we have less necessity for the evolution of heat; in low temperatures, more. Accordingly, in the former, the arterial blood remaining arterial, is nearly as florid in the veins as in the arteries, and the inspired air is less vitiated; in low temperatures the venous blood is extremely dark, and the inspired air more vitiated. Some have imagined that the body remains at its standard high temperature by the refrigeration of the evaporating sweat. But though this must contribute, it is not the sole cause; for frogs lose as much, proportionably to their size, by evaporation,

Brodie's experiments, therefore, came opportunely to relieve the lovers of new doctrines[*]: by these the perennial temperature of the body was referred rather to certain conditions of the brain and nerves, than to any chemical decomposition of air within the lungs. Mr. Brodie found, that, after removing the head of an animal, he could keep up respiration by artificial means; that the usual changes from a venous to an arterial state, by the abstraction of carbon, was carried on as completely as by the ordinary process of breathing; but that, notwithstanding, the temperature of the animal gradually lowered, until the action of the heart ceased altogether. Mr. B. also found, that, by impairing the nerves of any part, the heat of the part is impaired in proportion to the extent of injury received by the nervous branches, although the circulation be continued perfect. He argues, therefore, that *were animal heat derived from the change which takes place in the blood from a venous to an arterial character*, it would follow, that, so long as the action of the heart could be maintained, the temperature of the animals thus experimented on would be preserved, as well as the other phenomena. To this theory also there have been found very weighty objections[†]; and great difficulties certainly occur in applying it to all the phenomena before us. My intimation, when I commenced this inquiry, is thus verified; and the inquirer will learn from what has been set down, that there is yet much to acquire before the rationale of the action of the air on the blood can be rendered clear to our understandings. I will, therefore, now turn from the theory of the subject to some of the important facts connected with it; and the favourers of either hypothesis may adapt it to a solution of the phenomena at their pleasure. It is observed—1st, That an animal becoming exposed to a change of temperature, always experiences a change in its own heat also[‡]. 2d, If an animal be exposed to temperature which greatly exceeds its own ordinary standard heat, by some inherent capability of counteraction cold is generated[§]. 3d, Re-

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as any other animal, and yet they follow pretty closely the surrounding temperature. Whenever, on the other hand, the body itself heightens its temperature, as in fever, more oxygen is consumed by the lungs. The temperature of the various classes of animals, and their vitiation of the air, are always proportional, and inverse to the length of time they can live without air.'

[*] It is however denied that this is a new doctrine: it is said to be a revival of the opinions of Caverhill, as noticed by Haller in his *Auctarium*. But that it is to the experiments of this able physiologist, Mr. Brodie, that we owe it its present notoriety, is beyond all doubt.

[†] An opponent of the agency of the nervous system in generating heat, observes, on this fact, that forcible and unnatural respiration always produces a large secretion of bronchial mucus, the evaporation of which alone might occasion a decrease of temperature: 'But whether,' he continues, 'the fall of temperature be owing to the evaporation of this copious secretion, and its prevention of contact between the air and air-cells, or to the injurious nature of artificial respiration, still the fact ascertained by Le Gallois, viz. that under artificial respiration the animal may be killed even if no part be injured, destroys the conclusions which appeared deducible from Mr. Brodie's experiments. Indeed, he adds, Le Gallois found that less oxygen was consumed than in natural breathing, and that the temperature fell exactly in proportion to the smallness of the quantity of oxygen consumed.' Dr. Copeland, on the contrary, argues rather strongly in favour of nervous energy against chemical action as the generating cause of the heat of the system. 'The ganglionic system of nerves,' says Dr. C. 'by means of the influence derived from its principal and subordinate sources and numerous distributions, and exerted upon the vascular system, generates animal heat throughout the body, and the production of animal heat takes place in a manner analogous to the processes of nutrition and secretion. The experiments of insulating a limb, by dividing all the voluntary nerves and arteries, excepting one arterial trunk, performed by Mr. Brodie, in order to ascertain the effects produced upon the generation of heat in the limb, prove this proposition, and could not fail of giving rise to what was actually observed. For the ganglial or vital nerves supplying that vessel could not be completely detached as long as any of the coats of the artery remained undivided.' To this, in another part of the same quotation from Dr. Copeland, the following may be added, and which, in my own opinion, offers a clearer and more satisfactory view of the subject than has appeared. "*Animal heat*, however intimately related with the respiratory process, cannot be considered a function of the lungs. It must nevertheless be allowed, that *the changes induced on the blood during respiration are preparatory to the evolution of this heat*; and although we contend that the effect is immediately the result of a manifestation of the vital influence of the ganglial system of nerves, exerted upon the blood contained in the vessels to which these nerves are distributed, yet it must be admitted that the respiratory processes are requisite to its production, inasmuch as they produce on the blood a change of properties which are requisite to excite this system; and as this fluid, when thus changed, contains the materials necessary to, or is otherwise in a suitable condition for, the manifestation of the influence which that part of this system of nerves which is distributed to the bloodvessels exerts."

[‡] This, as one of the general laws, must not impeach that tendency observed in animals generally to preserve a natural temperature of their own, *more* or *less* distinct from the medium which surrounds them. This natural temperature is, however, so widely different among them, as to occasion a division into warm and cold-blooded; thus, while the temperament of birds is 110 degrees, of the horse 100, and of man 96, 97, or 98, that of fishes is not more than two degrees warmer than the water they inhabit. It is still observed, notwithstanding, that the heat of the body is influenced, to a certain degree, by the media around it. Dr. Davy found the heat of the human body two degrees higher in Ceylon than in England: summer heats increase the temperature of birds as much as six degrees: in the horse it is heightened two degrees only; but may be raised in the dog to 109, by bathing him in water at 112.

[§] The increase of heat in the animal body is limited: thus, in the dog it could be increased only to 109 degrees, although in a medium of 112. But in other cases this is more evident. Dr. Fordyce found that in a heated temperature his body reached to 100 degrees; but when the external temperature was further heated to 211, it did not raise the heat of the body beyond that measure.

verse these premises, and heat is evolved[*]. These powers of resisting the force of external agencies when applied to an extraordinary degree, and yet of submitting to them in a limited one, excite in our minds wonder and interest: but let us now proceed to consider the means by which the waste of blood in the support of the machine is brought about.

Having thus cursorily endeavoured to sketch the doctrines used in explanation of the alteration which the blood undergoes in the lungs, as well as the phenomena which result from it, I shall endeavour to turn them to the grand use of anatomical and physiological research,—that of connecting them with our physical and medical treatment of animals. The capability given to animals to support a perennial and equable temperature, enables them to live and propagate in climates equally scorching and cold; and, in point of geographical distribution, that valuable subject of our research, the horse, is a very extraordinary instance; but, on the other hand, as it has been shewn that an increased temperature around will increase the animal heat, so, according to the chemical theory, more oxygen is consumed, but, according to the same theory, the enormity of the process cannot be continued; and in hot climates we do actually find that asthenic diseases, in both man and brute, soon assume a sthenic character. In cold climates, and in the cold parts of the year of temperate ones, the omnivorous animals seek animal food, and the graminivorous also require something like it in the gluten of grain: they will even thrive on fish and flesh; and in all cases more food is required to keep up the animal temperature in winter than in summer, which hint ought not to be lost on us in feeding our horses, &c. In warm climates, on the contrary, and in the summers of all, light vegetable food is sought after by the animals themselves, not only to keep down the putrid tendency, but also to lessen the absorption of oxygen; and were we to follow nature at this season, we should alternate with our corn a portion of green food. Our treatment of disease, when the temperature is high, ought to be regulated by the same principles; and as a hurried circulation evolves more heat, and such evolution expends the vital powers, we should use every means to moderate the surrounding temperature, or to adapt the constitution to bear up against it: on the contrary, in winter, warmth should be encouraged as a stimulus to the flagging powers. Animals pant in summer to pass off by exhalation serous moisture from the lungs, and the evaporation with it carries off superabundant heat: but, *cæteris paribus*, horses breathe uniformly more frequently in winter than in summer, purposely to encourage calorification. Is it the alleged abundance of oxygen in the air in frosty weather which makes horses more frolicsome at those times? or does it arise from an instinctive disposition to use muscular exertion? which has a very powerful influence over the heat of the body, as we well know. The heat so generated would become distressing, but that sensible sweat breaks out, and the heat escapes with the evaporation occasioned. If this sweat is a natural relief in summer, it can only be a forced one in winter: it is no wonder, therefore, that exhaustion and disease follow the evils of allowing horses to remain in a perspiring state in a low surrounding temperature, and particularly if exposed to the action of the air, which increases the evaporation, and consequently deprives the surface of caloric; or, in familiar language, produces cold. During sleep, the temperature sinks somewhat, and therefore horses, as well as most animals, seek a sheltered situation for the purpose; it is, however, a singular fact, that, except there be rain, a horse is seldom found in his box, but commonly in his paddock: if the night be frosty, but serene, this will be invariably the case. Wind and wet, by favouring evaporation, encourage a surface-cold, if it may be so expressed: a bright atmosphere affords oxygen for the lungs, and a surface-heat follows.

I have elsewhere insisted on the advantages of a circular form of chest; the proofs may be noticed here: the quantum of air received will be greater; the absorbing surface for it to act will be equally so; and the aeration of the blood correspondent to both. In disease, the phenomena exhibited by respiration are many and well marked. The heaving at the flanks has been already pointed out, the increase of heat is also manifest, as long as oxygen can be fully received; but when congestion has impeded the circulation, the cold extremities evince that all the vital heat rallies round the centre, or makes its strong hold in the diseased organ; and the livid or otherwise purpled nostril shews that the necessary changes are not going on in the blood. Morbid chronic derangement in the pulmonary structure affects the temperature also: the broken-winded horse exhibits an abstraction of heat of 1°, and sometimes of 1½°, below the ordinary standard. The subject is fascinating, and capable of much amplification; but I have already trespassed on my just limits.

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[*] It is proved that the action of the surrounding temperature on the heat of the body is kindly limited both in its increase and decrease. Life of the lowest kind is enabled to resist cold; a living egg is frozen with much more difficulty than a dead ('rotten') one; and a living, than a dead plant. An animal body, placed in water at 44 degrees, sunk rapidly in its temperature from 98 to 87; but at the end of twelve minutes, arose to 93½ degrees; and in another instance, had reached to 90 in thirteen minutes: such are the constitutional powers derived from calorification in the lungs. We are aware of these facts, but we are not so well aware of the means by which they are effected. The lungs, we have seen, are enabled to receive heat from without; and quickened respiration may separate even more than an ordinary quantity of it: pulmonary exhalation also carries off an excess of heat. The skin also, we have reason to think, is a powerful agent in regulating the temperature of the body; it is naturally a bad conductor of caloric in its ordinary states; but when actively engaged in sensible perspiration, it acts most powerfully in restraining inordinate heat; nor is it unlikely that the skin is also a recipient of air under certain electric modifications, by which heat may be both increased and decreased, and rendered otherwise active.

ANATOMY OF THE ABDOMEN.

Of the Abdomen generally.

The external parts of the abdomen, or belly, are the common integuments; the abdominal muscles; the parts of generation in the horse, and the mammæ in the mare. The internal parts are the visceral investures, and the viscera themselves, as the *chylo-poietic*, the *urinary*, and the *spermatic*. The abdominal cavity, when its contents are removed, presents an extensive oval vault, bounded anteriorly by the diaphragm, posteriorly by the bones of the pelvis, superiorly by the vertebræ, laterally by the ribs, and inferiorly by the abdominal muscles. This cavity, for the convenience of anatomical and surgical description, is divided into imaginary compartments or *regions;* and as certain viscera are treated of as within the limits of certain regions, and the symptoms of diseases are pointed out by their presence in such or such region, it is very necessary not only that the veterinary surgeon make himself familiar with their names, but more so with the viscera, whole or in part, which occupy them.

The *epigastric* region includes the anterior portion of the abdomen, and extends from the ensiform cartilage to the boundaries of a perpendicular line drawn immediately behind the point of the last false rib, which will be found to be within four or five inches of the umbilicus, or navel. Minor divisions form the lower portion, included between the ribs into the *scrobiculus cordis*, and the parietes into the *right* and *left hypochondria*. The central portion of the belly forms the *umbilical region*, which commences four or five inches anteriorly to the navel, and reaches also so much posteriorly to it, taking in the portion that two transverse lines in this direction would form; that is, from one anterior spinous process of the ilium to the other: the lateral and superior parts of this are termed the *lumbar regions* The *hypogastric region* extends from the posterior limit of the umbilical region over the rest of the abdomen, and admits of lateral divisions into the *iliac regions*, or flanks, intersected by a middle portion, known as the *pubic region** or *groins*.

The *relative situation of the viscera within the regions* may be thus stated:—the large intestines occupy the whole inferior portion of the abdominal cavity, as well as a considerable part of its sides. The apex of the cæcum places its large blind end along the right side of the abdomen to the diaphragm, encircled almost by the circumvolutions of the colon; and thus a wound penetrating any part of the lower marginal half of the abdomen of the horse is sure to protrude some portion of the large intestines. In the horned ruminants, such a wound any where not greatly below the median line, particularly on the left side, would more probably penetrate the paunch or first stomach. When the large intestines are removed from the abdomen, the small intestines, which in a natural state lie over them, come into view, whose situation, as regards the regions, is not strictly determinate, but depends on their state of distention and the peristaltic motion. The stomach will be found to occupy the left hypochondriac region when empty, and when distended, to stretch itself into the epigastrium. (*plate* IV.) The liver is attached to the diaphragm in the epigastric region, and extends into the right and left hypochondriac regions; a small portion is found in the left hypochondrium. The spleen occupies a space in the left hypochondrium, between the great extremity of the stomach and the left kidney. The pancreas will be found principally in the left epigastrium, while the renal capsules and kidneys occupy the lumbar regions: and the bladder, with the parts of generation, occupy the pubic region in the horse, and both pubic and hypogastric in the mare.

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* Girard departs from the human type in describing these imaginary boundaries, and makes four principal regions: 1, anterior or diaphragmatic; 2, posterior or pelvic; 3, a superior or sub-lumbar; 4, an inferior and larger. The centres and lateral portions of these form, as in the human, subdivisions, which do not differ materially in name or limit from the human. Mr. Percivall, in my opinion with more propriety, owns three principal divisions, an anterior, posterior, and central; each of which admits of three subdivisions.

The peritoneum is a strong dense membranous lining to the abdomen, as well as an investure and support to its contents, performing the same office in this cavity that the pleura does in the thorax, or that the cuticular integuments do to the body generally. Its outer surface is loose, and full of membranous attaching villi, of different lengths and strengths; its inner surface, on the contrary, is remarkably smooth, and exhales a serous fluid for lubrication. Regarding it *per se*, it may be traced from its anterior connexion with the diaphragm, whose posterior or abdominal surface it completely lines, as the pleura does the anterior or thoracic, and thus completes the septum, by meeting the pleura in the intervals of the diaphragm. From the epigastric region it either *extends over*, or is *reflected on**, most of the viscera, as the liver, stomach, spleen, pancreas, and kidneys, when, dipping into the pelvis, it passes over the fundus of the bladder and a part of the uterus; it next partly invests the rectum, and again descending, protrudes itself in the male in the form of two pouches, through the abdominal rings, in which the testicles are lodged, and from which they receive a vaginal coat. The peritoneum now proceeds to traverse the lower surface of the abdomen, furnishing that vicinity and its contents in the same manner; completing the integrity of the sac at the diaphragm, from whence we commenced our description. Besides its investures, it is remarkable for it *prolongations*, some of which are mere sheaths to the vessels: other folds form ligamentous ropes, as those of the liver, that which originally formed the umbilicus; and also two, the *posterior*, of similar origin. It likewise gives suspending prolongations to individual intestines, as the mesocolon and mesorectum, but its most important are those which form the mesentery and omentum. The peritoneum derives its vessels and nerves from the surrounding parts, and is, like them, very vascular, and therefore equally subject to disease. In any acute inflammation of the abdominal viscera, it is generally found inflamed also; but pure peritonitis is rare; it, however, often becomes inflamed from wounds into the cavity of the abdomen, and not unfrequently it follows castration also. Thickenings and adhesions are not uncommonly met with in subjects who have been slaughtered, which I attributed to attacks of enteritis; and it is to a morbid increase of its interstitial fluid we attribute ventral dropsy.

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* A just idea of the peritoneum is best gained by considering it as a large closed bag placed within the belly, into the outer surface of which some of the viscera are wholly indented, and thus *reflected over* by it; others it simply passes over, without any reflection or individual investure, of which the kidneys form an instance.

The *uses* of the peritoneum are not only to protect the abdominal contents, but also to suspend, confine, and keep them relatively situated towards each other; at the same time by the smoothness of its surface, and by the fluid it secretes, to allow free motion between them. It is at once very strong and very elastic, as is sufficiently apparent by what occurs in pregnancy, ascites, and accumulations of fat, in all which cases it accommodates itself to the distention; but on the removal of the distending cause it soon regains its original size.

The Omentum.

The *omentum*, or *caul*, are doublings of the folds of the peritoneum, two of which are derived immediately from that proper to the stomach, and two other are formed from the mesenteric lamen reflected from the intestines. Within these duplicatures, adipose nodules are dispersed, but which are in small proportion in the horse to what are found in many other animals; as in the hog, where as soon as the abdomen is opened, the omentum, grossly fat and long, spreads over the whole contents of the belly. In the ox and sheep also, the principal fold alone incloses the four stomachs and duodenum: but in the horse its extent is small, and, besides its attachments to the great curvature of the stomach, it does little more than cover part of the pancreas, and a small portion of the colon, to which it is also attached. (Vide *d*, *g*, *plate* IV.) The horse, therefore, is not subject to epiplocele, as dogs and some other quadrupeds are. The uses of the omentum are conjectural only.

The Stomach.

This important alimentary bag, which stands at the head of the chylopoietic viscera, comparatively, is remarkably small in the horse*; and in figure, under slight distention, is not unlike the bladder part of a bagpipe. (See *d*, *plate* IV.) Structurally, it presents diversities: its situation may be described as being immediately behind the diaphragm, its principal portion occupying the left hypochondrium, and a smaller part the epigastrium, with its expellent orifice stretched across the spine to the right side†. It has two surfaces, which may be called its sides, though one is posterior, and the other anterior. It has also two extremities, the larger of which, directed towards the left false ribs, forms its *fundus;* and a smaller, which, after a slight curve that carries its posterior to the largest extremity, forms the *pylorus.* Its arches or *curvatures* are, a large one, to which the omentum and spleen are attached, and a smaller, formed between its openings or *orifices*, which are a *cardiac* or recipient, placed near the centre of the lesser curvature, and a *pyloric* or expellent, forming the right or small extremity, distinctly seen in *plate* IV: the cardiac orifice being hidden by the stomach, which may be considered as nearly opposed to the letter *d.* By this description it may be seen that the stomach, when moderately distended, must lie in an obliquely transverse direction, with its greater extremity projected a little forward, and its two orifices superiorly inclined, but the cardiac the most so. The stomach is formed of two general investing coats, and two others partially supplied; but the whole display a general intention favourable to the varying capacities of the organ. The first or peritoneal tunic does not adhere with much tenacity to the muscular surface, and as it gains the larger curvature, entirely separates into two layers, which first furnish a sheath to the gastric vessels and nerves, and are then continued onward to form the omentum. The second coat, though distinctly muscular, is of a pale colour, and exhibits considerable speciality, as well in the strength as the direction of its fibres, which are principally a longitudinal and a transverse plan, but intermixed with others, whose direction is more oblique. The longitudinal and most external plan (*c, c, plate* V), appears a continuation of the outer one of the œsophagus, strengthened by additional original fibres, which, spreading over the lesser curvature, carry themselves obliquely around, and likewise over the great extremity, where they conspicuously form themselves into a kind of vortex round the central part of the fundus. The inner, and by much the largest plan, is not quite circular in its direction, but slightly oblique, intersecting the course of the longitudinal plan; it is very thick and strong around the œsophagean extremity, and altogether exhibits so much structural speciality, as to warrant a conclusion that it was purposely placed there to prevent the return of the food, to which I shall again recur in the physiological detail[*].

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* It is, however, capable of such distention, as to have been found with upwards of forty pounds of undigested hay in it; but this, it must be remarked, was a remarkable instance, as it has become ruptured from combined gaseous and solid contents of much less apparent bulk.

† It must be evident that the dilatation of a distended stomach will greatly disturb its described situation, seeing its attachments are purposely loose to favour its variable capacities. A full meal of herbage distends the whole abdominal parietes (even the diaphragm, under very great distention, is liable to be pressed forward); the small intestines are forced downwards and backwards; the spleen and pancreas also are somewhat displaced. Its pyloric extremity advances towards the right hypochondrium, its great curvature will approach the hollow of the epigastrium, and each inspiration will tend to drive it into the umbilical region. With the mechanical pressure occasioned by the visceral changes of situation, can we wonder at the phenomena occasioned by a full meal? And although, by specialities yet to be noticed, the stomach of the horse is less liable to distressing distention than that of most animals, yet we must not presume that we can with impunity exercise him violently, any more than ourselves, immediately after a full meal; neither ought we to lose the force of the restrictions already laid down against galloping a horse immediately after drinking, 'to warm the water in his belly.' But as it will be seen that water passes immediately into the intestines, so it may be always proper, when a horse drinks his fill of very cold water, to move him *moderately* afterwards, and more particularly so if he were previously heated. On the distention occasioned by a full meal, the advantages

The inner surface of the stomach presents the *two partial expansions* already noted, and which are a cuticular and a villous. This species of *cuticular* covering to nearly one-half of the stomach appears to be peculiar to the granivorous monogastrics, and is present in rats and mice; and appears to form it into a curious and connecting link of stomach placed between the true membranous one of graminivorous animals, and the muscular of the

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of a circular form of trunk (' a barrelled carcass'), so often insisted on, must again strike the reader as being here particularly apparent; and that, in the absence of this form, caution will become more immediately imperative.

[*] A valvular apparatus to the cardia of the horse's stomach has been altogether denied by some comparative anatomists and veterinarians; but I am disposed to think that a careful and unbiased examination of the parts will detect the structural intention to be of this nature; on which subject Girard observes:—A partir un peu en arrière de la crosse de l'aorte, jusqu'à l'estomac la membrane charnue du même conduit œsophagien devient insensiblement blanchâtre, plus forte, plus épaisse, et prend une fermeté très-remarquable; elle tient cette extrémité gastrique dans un etat permanent de constriction, qui ne cède qu'aux substances poussées de la bouche vers l'estomac. En abordant dans le ventricule, cette même membrane forme de fortes lames superposées, et dont une, la plus grande, la plus interne et longitudinale, entoure une partiè de l'ouverture cardiàque. Se propage et se perd insensiblement dans les parois du vicère.

carnivora: it further bespeaks the ordination of this animal to be one of much locomotion; and for which reasons he was furnished with peculiarly powerful but compact digestive organs, and an aptitude to search for condensed food, in the form of vegetable gluten, to be found in farinaceous seeds or grain. This cuticular coat is a prolongation of that which, commencing with the mouth, extends down the œsophagus, is continued over nearly the first half of the stomach, covering its fundus or left extremity, and ends abruptly by a sort of fringed termination, very distinct from the next coat, over which its serpentine irregular edges are seen to lap by a slight rugose fold. (See *plate* V.) From the pharynx to its termination, this alimentary tunic is plicated, to admit of distention: thus the plicæ of the œsophagus are continued into the cardia, and in a less regular manner also over the remainder of the cuticular surface, making it slightly rugose. It is whitish in colour, and is perforated with secretory mucous openings, from whence a gastric secretion, necessary to digestion, is probably poured out. It is to this coat of the stomach that bots are so frequently found adhering, and which they sometimes penetrate.

The *villous* or *sensible portion* appears to commence from the line of termination of the cuticular part. It is at once firm, vascular, and exceedingly fine in its texture; and, when attentively examined, presents innumerable villi, which probably are the minute ramifications of bloodvessels, from whence the solvent gastric fluid is secreted. The surface of the villous coat is likewise furnished with waving folds, by which it suffers no injurious pressure when the stomach is filled, but can easily accommodate itself to the elasticity of the other investitures. (Vide *d*, *plate* V.) The villous rugæ are largest towards the great extremity, but towards the duodenum they lessen, and at the pylorus they unite with some muscular fibres to form a valvular apparatus, which prevents the return of the food, as well as its too early exit: these prolongations throughout not only hinder the too speedy passage of the food, but they increase the surface of secretion also.

The stomach, as a secreting organ, is very plentifully supplied with blood from gastric, splenic, and hepatic trunks, which proceed in a tortuous direction, to avoid the effects of distention; and, in accordance with the same end, the gastric veins which return the blood possess no valves to impede its progress towards the vena portæ. The nerves are supplied by means of an appropriate and important pair called the par vagum, or eighth, and branches of communication from the abdominal ganglia; which tend to unite the stomach in one sympathetic union with all the principal viscera of the body; and from whence result some of the most important phenomena observed in the animal machine, both in health and under disease.

The *diseases of the stomach of the horse* have been thought not numerous or important, from the circumstance of there being so large a portion of insensible surface to it. But such an opinion, grounded on a consideration of the stomach being more a triturating than a solvent organ, has proved erroneous: for although it presents some likeness to the triturating properties of the one, it is infinitely allied in secreting and solving properties to the other; and as it owns all the vascularity and nervous sensibility of the latter, so also it is liable to become morbidly affected. It is also subject to functional derangement, from its extensive visceral connexions, and its direct sympathy with them. To the skin also this is extended in a very marked degree: but we must refer to our *Nosology* for more on this head.

The Physiology of Digestion.

If a physiological inquiry into the aerating organs and their various phenomena be as interesting and important as I have endeavoured to prove it to be, surely a similar attention to the digestive organs and their functions can be no less so. *Digestion* may be characterised as that wonderful power whereby substances received into an animal body lose their own properties, and become endowed with those of the constitution in which the assimilation is carried on. That this animalization takes place within the stomach has been always allowed; but in what manner it is brought about has always been, and still remains, a subject of unwearied experiment and endless dispute. The various actions of an animal body produce a waste of its energies and a decrease of its parts, which are indicated by the sensations of fatigue and hunger. To restore the tone of parts, *rest* is required; and to repair the waste, *food* becomes necessary; and now *hunger* and *thirst*, which appear to be sympathetic feelings of the stomach with its own wants and those of the constitution generally, stimulate its owner to take in solid and fluid aliments. By the distinguishing terms of *its own* as well as that of *constitutional* want, it may be gathered that I consider this sympathy as subdivided into individual and general. That the stomach sympathises with itself principally, in some cases, is proved by the fact, that the mere mechanical distention of a draught of water will, for a time, satisfy the sensation of hunger; but as it does not repair the loss of chyle, so a repetition of the draught, instead of affording relief, only adds to the general prostration: it is also by its distending properties, probably, that food taken invigorates long before its chylification has taken place[*]. The constitutional sympathy admits also of partial relief by other means than constitutional repair; thus the inanition of a *hunter* long employed in reaching a distant cover is no bar to his after-exertions in the chase. However fatigued, the moment he hears the well-known sounds, he receives a temporary supply of nervous energy, which acting on his irritability (i. e. his passions), produces renewed muscular exertions: but the chase over, the supply having not been one of pure renovation, a double prostration is the consequence, and the nervous supplies being already expended (which have so great a share in the digesting process, as seen in the *Physiology of the Nerves*), it often happens that the stomach is unable to renew its sympathy, and the horse become 'too tired to eat.'

Thirst differs from hunger principally by its excitement to receive liquid instead of solid ingesta: it is equally a sympathetic feeling in the stomach to repair waste; but not one of the solids, but of the liquids. It calls for supplies for the fluid parts of the blood, wasted in secretion: thus, perspiration produces thirst; and it is thus that diurectics do the same. It is also instinctively sought for the purpose of diluting the food: it may also be remarked of it, that it is variable in the quantity sought; some animals, horses particularly, requiring three times more than others: in broken wind, thirst is invariably present, and all inflammatory affections increase it. Of the manner by which liquids are imbibed by the mouth, Mr. Percivall gives the following correct and descriptive account:—'The lips being immersed in water, and separated for its admission, the tongue is rendered concave upon its anterior surface, and projected in close contact with them, along whose hollowed dorsum, as along a channel, the fluid mounts as it is imbibed by suction: the want of such previous collocation of these parts occasions the confusion in swallowing when we drench a horse. The animal exerts the power of suction, by first rendering his mouth inaccessible to the external air, and them forming a vacuum in it by inspiration, into which the water rushes, from the pressure of the atmosphere upon its surface, as into the cylinder of a syringe: flowing along the tongue into the pharynx, it ascends (should the horse be drinking from a pond), in consequence of the contractions of these parts, in successive portions, by the groom called *go-downs*, through the œsophagus into the stomach.' Stimulated therefore, by the sensations of hunger and thirst, animals seek for and take into their stomachs such matters as their organs are fitted to the assimilation of, and to which they are instinctively directed by their senses of smell and taste. The horse and his congener the ass are granivorous by structural markings, and, were it always within their reach, by choice also; they are also graminivorous by usage, and herbivorous by compulsion: and both can be supported when strictly confined to either of these diets, according to the usual acceptance of the terms[*]. The stomach of the horse is therefore, by nature, kindly made an organ of adaptation, and is enabled, when absolutely necessary, to convert into nutriment most of the matters around him; which circumstance, united with his capability of supplying himself with a requisite quantity of heat, as pointed out in the *Physiology of the Blood*, has given him a wide geographical distribution.

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[*] Wolves are said to eat mud when very hungry, to stay their appetite by the mechanical distention of the stomach; and it probably is more for this purpose than as absolute nutriment, that the Indians take in steatite, mica, clay, and other inorganic substances. Many circumstances tend both to increase and to diminish hunger, but which may be all referred either to the state of the stomach individually or to its tendency to sympathise with the body generally. Cold air applied to the skin; stimulants, as spicy cordials, and moderate doses of mineral acids and vegetable astringents; the sight of food, or the note of preparation for feeding themselves or others, act on the stomach immediately; while warm clothing, heated stables, diverted attention, and great quantities of water, are unfavourable to the sensation. Sickness lessens the sympathetic action of the stomach in its desire for food; but it is a known fact, though not well understood, that it operates much less in the horse than in man, and even less than in many other domestic animals. Query, are the structural peculiarities at all influential in this? From these facts many practical hints may be drawn, which our limits will not allow us to detail. It may be added, that hunger, though consequent on an empty stomach, does not arise from mechanical friction of its parietes together: were this the cause, it would be constant, whenever and as long as the stomach remained empty; whereas we know that in the longest privations there are alternate periods of ease and stomachic distress.

The mastication, insalivation, and deglutition of the food have already been noticed. (See *page* 191). But I would again urge my humble opinion, that we by no means usually give to the saliva its full merit as an important agent in the digestive process. When we consider the quantity given out, the chemical nature of the fluid, its remarkable affinity for oxygen, and that a complete mastication invariably produces a direct change in the qualities of the food, as well in taste and odour as by chemical analysis, it would be most unphilosophical to regard it as a mere *diluent*[†]. The masticated aliments received in the stomach become subjected to the further action of two gastric fluids; one supplied by the secreting orifices of the cuticular portion, without doubt assistant to the great work of digestion[‡], and to another more abundant and more important, of a mucous consistence, the produce of the secreting surface of the villous portion. The *gastric mucus*, or *juice*, is possessed of a solvent power *sui generis*[§]; but to subject the ingesta to its action, requires that they be applied to it *in situ;* that is, to the secreting surface which generates it; and here I feel somewhat diffident in expressing my full conviction that it (the stomach) has an *ordinary* and an *extraordinary* process.

The *ordinary* process is adapted to the horse, both as a graminivorous and an herbivorous animal, in which case the masticated vegetable matter is indiscriminately deposited in the cuticular cavity of the stomach generally, from whence it is propelled forward by muscular contractions of the organ in the direction of its great curvature, from left to right, towards the pylorus; being, however, so turned and contorted in its passage, that every portion of the mass becomes first macerated with the cuticular secretion, and then receives the more important accession, as it is propelled forward, of the solvent gastric mucus[*]. It is thus that a mass of vegetable matter, of the nature of hay, grass, or other succulent herbage, passes the assimilating process within the stomach, which readily and quickly reduces it into a semipultaceous mass, called chyme, after which it is hurried onward to have the chylous animalization completed within the intestines.

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[*] We must be careful to avoid a false but favourite theory, which had crept into physiology,—that the powers of the stomach were necessarily confined to an assimilation of nutriment from such matters only as appear, *à priori*, calculated for that purpose. It is true, that the distinctions between carnivorous, graminivorous, and omnivorous, are justified by an examination and comparison of their organs of chylification: commencing with those whereby they obtain their food, those by which they perform the manducation of it, and the peculiarities of the alimentary track it passes through, during its conversion into chyle: these all evince the intention of Nature to sustain life more readily, by the adherence to such aliments as their organs are thus evidently designed for. But life, happily for all these, can be supported by food not apparently intended for them: and experiments have proved that the stomachs of the carnivorous tribes can, when pressed by necessity, perform the office of animalization of vegetable food, as those of the herbivorous can support life by animal matter. The Arabs, it is said, are even fond of feeding some of their favourite horses on milk; many of the Indian tribes, also give their horses flesh; while others, who reside on the sea-shore, occasionally feed theirs entirely on dried fish. At the Veterinary College, a horse was supported some time on animal matter alone. Granivorous birds, as pigeons, &c. have been brought to live on flesh, and to prefer it to any other food; and the piscivorous otter, in state a of domestication, will live and thrive on potatoes. Eagles, falcons, and owls, have been experimented on by Spallanzani and others, and were found to subsist on pure vegetable matter, without much alteration of condition or strength.

[†] It has been said the affinity for oxygen in the saliva renders it more than probable that nitrogen is also received; and we discover a new source for the introduction of nitrogen into the circulating fluids, beyond that gained from the mere food itself. But facts speak more loudly, and we need not inform the observant veterinarian, that the rapid eater is seldom a horse of good digestion; his aliments not only pass unmasticated, but frequently so little acted on, that the oats ejected will vegetate. During a famine in India, the wretched natives extracted the unbroken grains of corn from the dung dropped by horses, which they ate. In ourselves, the rapid masticator, from a partial insalivation, is, in almost every instance, troubled with a slow and painful digestion.

[‡] I perfectly coincide with Girard in such a view of the follicular openings observed on the cuticular coat. A simply sebaceous matter would have been unnecessary: here is nothing to guard from abrasion; no unctuous shield required from atmospheric application; the secretion is, therefore, without doubt, a macerating, and probably a slightly solvent one also.

[§] The gastric secretion has been a subject of an infinity of experiment: John Hunter stood foremost in the throng, yet this distinguished physiologist was wont, in his lectures on the digesting process, to sum up the account laconically, by—'Gentlemen, the stomach has been held by some to be a mill; others will have that it is a fermenting vat; others, that it is a stew-pan; but, in my view of the matter, it is neither a mill, a fermenting vat, nor a stew-pan; but a stomach, gentlemen—a stomach.' A grand difficulty to a precise knowledge of the nature of this fluid is, that it varies in different animals, according to the nature of their food; in man it does not act readily on bones; in dogs, bones are as readily digested as flesh; in the horse it is a thin transparent mucus, slightly saline, and destitute of smell; and it colours blue vegetable juices red. But we are not to look for the measure of its properties in its chemical characters; these may, it is true, have some influence, by affording, in conjunction with the saliva, nitrogen or azote; but we rely mainly on its living power. It neither ferments nor promotes a decomposition of the substances it acts on; on the contrary, it arrests fermentation, and possesses a preservative quality. Its principles of action, therefore, are independent of all these and other agencies formerly attributed to it, *but are derived from a principle within itself*, which enables it to act on organic matter already dead, and on that only, for life has a particular power to resist its action: hence bots, and other worms, reside unhurt within the stomach; but destroy them, and they become dissolved like other matter: and it is in this way, that this secretion has been found to operate upon even the stomach itself after death.

The *extraordinary* process is somewhat different, and is calculated to shew the wonderful powers inherent in the organs for adapting themselves to exigent circumstances. It must be premised, that the horse exhibits specialties which were evidently given for specific purposes. His vast bulk, yet vast powers of locomotion; his inherent capability of subsisting and reproducing in almost every climate; these important circumstances would, *à priori*, lead us to expect structural peculiarities to meet them. He is one of Nature's noblest works: magnificent in stature, he is yet endowed, as has been happily expressed, with a *specific energy*, which renders him capable of vast and continued exertions: and his power is exceeded only by his rapidity, for which ends his organization throughout appears to be designed. The bulky stomach of the ox would have proved to him most inconvenient, yet a greater consumption of food, and a more complete conversion of it into chyle, were more necessary to supply his energies than those of the ox. We find him, therefore, furnished with a single stomach, capable of extracting *ordinary* nutriment from herbage, and further furnished with a functional ability of extracting an *extraordinary* supply from farinaceous matters, for a more ample extension of his powers when necessary[†]; for we need not inform the reader that the original organic moleculæ in the farina of plants infinitely exceed those which reside in their stems, or that found in the ligneous fibres of wood or the foliage of shrubs. The specialties hinted at, by which the horse assimilates extraordinary nutriment without injury to his general properties, are both functional and structural. The *functional* is derived from the great energies of the stomach generally, the nature of the gastic juice, and the *longer detention* of the food to be more completely acted on. The *structural* part of the speciality consists in the form of the æquine stomach, its muscular fundus, and of a particular covering to the first half of it. It was long ago observed by Spallanzani and others, that the great pouch of the horse's stomach gave it a near resemblance to the rumen or paunch of the ox, &c.; and he conjectured that it was destined to the *detention* of *particular* parts of the food; and by actual experiment, it has been since discovered that the food is really distributed in the stomach of the horse according to its qualities[‡]; and we now feel assured that the large pouch-like left extremity of his stomach is purposely intended to receive and detain within it such food as requires more complete maceration and more active pressure, and which can be readily performed by means of the muscular vortex around the centre of the fundus, aided, as it must be, by the cuticular covering to the part. Thus, when farinaceous food is received into the stomach, an undulatory motion takes place, which, by pressing and wedging the masticated grains together, not only softens and separates their substance, but most intimately mixes the gastric juices with them: for I am fully of opinion that the motion of the stomach is not equal throughout its whole length, but that it has a rotatory winding or twisting movement, different from that of the villous half, which, by means of its longitudinal fibrous plan, partakes more of the true peristaltic motion*. To proceed: the mass, in its progress towards the pylorus, becomes more completely saturated with the true gastric mucus, and the work of *chymification* being finished, the chyme is protruded through the pyloric outlet, to be further acted on for perfect *chylification* in the intestines. This view of the digestive processes in the horse, I am aware, is open to discussion as it regards the discriminating powers of the stomach, the purposed detention of

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[*] It is somewhat extraordinary that Girard takes little notice of the effect which the cuticular covering of the stomach must have on the phenomena of digestion; neither does he seem apprised of any difference between the processes, according to whether grass or grain be the substances acted on. With him, only general action is pursued. 'The aliments are first deposited in the left sac of the stomach, and advance under digestion from the left towards the right, following the direction of the great curvature towards the pylorus; and an animal killed immediately after eating a quantity of hay, exhibits the contained matters in a state of chymification in the order of their entrance, and likewise in their order of original situation, so that the first received is nearest the pylorus, and *vice versâ*.' But had this celebrated anatomist varied his experiment, he would have found a very different result. An ass, experimented on by Mr. Percivall, had a quarter of a peck of oats given to it, which was eaten in twenty-five minutes: the animal was killed six hours after: in the stomach were found both grass and corn; the former occupied the vascular part, and the boundary line between it and the corn, *which all laid in the cuticular pouch*, precisely corresponded with that formed by the borders of the sensible and insensible linings. A horse was also fed with the same quantity of oats after a two days' fast, and six hours and a half afterwards was destroyed. Most of the corn was lodged in the fundus: its colour was unchanged, though it was converted into a soft, humid mass, consisting of husks, kernels, and parts of kernels, from which could easily be expressed a yellow liquor, into which the undissolved kernels were convertible by a little trituration between the fingers. It is therefore evident, that the process of digestion, as it operates on corn, is not altogether the same as that which acts on herbage: in the former it is delayed within the cuticular part of the cavity, and it is also proved that within this cavity a complete maceration and solution of the farinaceous parts of the seeds can take place; but it may be assumed, that a more perfect assimilation would yet be performed on it as it passed through the villous portion. Does there want further proof that the cuticular lining of the stomach is the first step towards the triturating nature of the gizzard of fowls and the gastric apparatus of some fish, as the trout?

[†] We may here ask, what could be expected of our machine horses of every description, were they fed on grass or hay alone? Who would witness the death of a stout fox, mounted even on a stabled horse, were he not grain-fed? The new locomotive apparatus must in such case be applied to our waggon wheels; for even here the *common process* of digestion would not suffice to keep up the necessary powers of the waggon horse: and in what part of the Beacon course would a *graminivorous* Eclipse trail his slow length into a stand-still, deprived of a deliberate maceration and animalization of vegetable gluten, drawn from oats, beans, wheat, or barley?

[‡] Spallanzani's experiments go directly to prove, that when the stomach of various animals contain more than one kind of food, that most easily digested is soonest evacuated. M. Lallemand also observes, that, from his experiments, he has found that aliments did not escape from the stomach in the

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order in which they were introduced. In ourselves the same fact often presents itself; when edibles are returned from the stomach by vomiting, nearly unaltered, some days after they were eaten, although ingesta received at the same time had proceeded in its natural course. Mr. Percivall relates two very satisfactory experiments made by himself, relative to this power of separation in the stomach of the horse, which have been already quoted.

* To suppose the stomach confined to the simple act of propulsion, is to take much too limited a view of its powers: vomition at once disproves it: and also that it may have a functional capability of adapting its movements to circumstances as they occur, we have no reason to doubt. In the ruminants, the cud when chewed and re-swallowed, then passes over the first two stomachs, from whence it came, and enters the third: the process also can be delayed at pleasure, when the paunch is full. Cannot the stomach of the horse, therefore, act somewhat *ad libitum* likewise? In no organ do we witness such a diversity of means, all tending to one grand end, as in the stomach. Well might it be by the ancients regarded as the seat of the soul, and by the moderns as the grand characteristic of animal in contradistinction to vegetable life. In some of the lower orders, as the polypus, the body forms one entire gastric cavity: as we ascend in the scale, the organs become more complex. In carnivorous birds, the œsophagus terminates in an ingluvies or crop, smaller and less muscular than in the granivorous, where the crop is large, very muscular, and internally lined by a cuticular coat, so strong as amply to compensate the want of teeth. In carnivorous quadrupeds the stomach is also small and muscular, and the alimentary track short; but in the herbivorous, on the contrary, it is much larger, and the intestinal track long. In the graminivorous and ruminants, the gastric cavities are multiplied into as many as four, as we find in the camel, ox, sheep, and goat. In the hornless ruminants, the second stomach is exclusively designed as a reservoir for water; and in some, as the camel and dromedary, is capable of holding a vast quantity, which is passed up as wanted, to be mixed with the dry matters chewed during rumination, or retained as a supply for accidental scarcity in their arid climes. But these are, most of them, what may be called stationary animals, and, with the exception of the camel tribe, they are usually located where herbage is luxuriant, and the necessity to travel in search of it is little felt. Their means of defence are borrowed from their horns, by which, when congregated, they are in little danger of attack, and consequently experience little necessity for great rapidity of flight. It is far otherwise with the horse; he does, it is true, congregate, but not in such masses as the ruminants: his means of offence are limited, and his flesh is peculiarly sought after by predacious animals. His original situation also appears to have been in open arid plains, where herbage is widely spread, and where his instinctive inclination for farinaceous food tends to make him rove still more extensively. In him, therefore, a form correspondent with these intentions was peculiarly necessary; and how eminently his structural peculiarities fit him for them, both his internal and external framing will amply testify. How adapted his external figure and the mechanical arrangement of his limbs are to the end, has been before pointed out, and internally we are proving that he is no less so. We find him encumbered with one small stomach only, not more than three times as large as that of a man; but far other proportions exist between the volume of the food received by each, which instead of three to one, are as six to one, which consequently were intended to supply the deficiency, and yield abundant supplies. It is self-evident, therefore, that if the horse have a small stomach, and yet eats so *largely*, and, as is well known, so *frequently*, he must digest all bulky food, as grass, with equal *rapidity*. He can drink eight or ten gallons of water at a draught, but his stomach will not contain more than two; and it also appears a singular union of intention, that fluids are passed with singular rapidity, that the effects of distention may be in every way avoided. The pure herbage-fed horse is almost always eating and always digesting: so much time is required to insalivate and masticate a sufficient quantity, that the first portions are passed forwards through the duodenum before the meal is finished; and it is by this wise provision that he is ever ready, in a state of nature, to fly from his swiftest enemies, as well as in a state of domestication, to be subservient to the purposes of his owner, provided they be not accelerated nor too long continued. By this ready digestion his respiratory functions are not impeded, nor is he, like man and many animals, liable to that healthy congestion after a full meal, which, by preventing the free return of blood from the head, retards its functions, and produces a disinclination to exertion and an aptitude to rest and sleep. The horse, on the contrary, I believe, never lies down to assist digestion; some horses never recumb, and in all it is done merely to relieve fatigue, and renovate their muscular structure. Analogy, has, therefore, deceived the trainers of race-horses, who have been used to darken their stables, and shut close their doors after feeding their horses, to encourage them to lie down: but as in horses a quick passage of the food is indicated by nature, so it may be reasonably inferred that gentle motion, but gentle only, would be more consonant with the natural habits of the animal. Both sleep and total inaction after full feeding are certainly favourable to the accumulation of fat in many animals, but it is doubtful whether it increases the muscular fibre in any. Thus pigs fatten rapidly when close shut up; stalled oxen do the same; and hence stable keepers and horse dealers closely confine their lean horses: but the practice is not attended with any accession of energy, or of solid and hard fibre, but of animal oil or fat only; it is not to be wondered at, therefore, that such horses, when suddenly put to work, so often '*fall to pieces*,' as expressed by horsemen.

the food in its fundus, and the immediate operation of its cuticular portion; but I am more and more persuaded that the phenomena which present themselves, and the physiological deductions which may be fairly drawn from the anatomical display, bear me out in such a consideration of it[*].

Vomition.—A structural peculiarity in the stomach remains to be noticed; by which, in all ordinary cases, the horse is denied the power of regurgitation[†] or vomition[‡]. These acts, so natural on the one hand, and so common on the other, to all but the monodac-

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[*] With very little alteration of sentiment, the foregoing views of the functional phenomena resulting from the peculiar organization of the stomach of the horse, have been those I originally set out with thirty years ago, as will be seen by a reference to the first edition of this Work. They are also, in most essential particulars, the same with those advocated by Mr. Percivall in his admirable 'Lectures.' Our principal difference consists, that in my view *some pressure* is actually made on the *farinaceous food received* by means of the muscular and cuticular mechanism of the fundus of the organ. But I have constantly and distinctly stated, that the pressure, grinding, or triture, or whatever beside it might be called, was of a slight kind only. A translation of the *first* edition (for I have not the work itself by me) says, 'Il ne faut cependant pas se figurer qu'il se passe ici rien d'analogue à la trituration qui a lieu dans le gosier des oiseaux. Il ne s'agit que d'une simple pression plus au moins lègère.' In the *second*, the wording is, 'may act by gentle constriction, producing a slight species of trituration in that part on the contained grain, which may produce a further maceration.' In the *third* it is stated, 'that by a gentle motion, effected by the vortex of muscular fibre around the fundus, the farinaceous grains are rather triturated against themselves than ground by the stomach itself, as in true gizzards.' Mr. Percivall is, however, of opinion that nothing like trituration occurs, but simple maceration alone; and he grounds his objections to any comminuting property in the fundus of the stomach derived either from its muscular or cuticular fabric; Mr. P. is, however, adverse to any even the smallest action of the kind, from a want of redness (i. e. strength) in the muscular fibres of this cuticular half of the stomach, as also from the absence of any superior quantity of muscular fibre possessed by this part; and further, because other parts have cuticular coverings without exercising any comminutive action. He also appears to consider that the fact of horses passing whole grains of corn, militates against any triturating power. The well known experiments of Spallanzani, on which this ingenious writer lays much stress, were made on masticated lettuce and trefoil, and not on grain; for which, I contend, the cuticular portion was principally given, and for the digestion of which the stomach can step out of its ordinary course of action by detaining, pressing, kneading, rubbing, or even slightly triturating, if the reader pleases, the grains against each other; and as these matters were enclosed in tubes, in Spallanzani's experiments, purposely to shew the solvent quality of the gastric secretion, and that only, they prove nothing against trituration. As regards the muscular structure of the stomach, a want of colour, I need not tell so excellent an anatomist, is no proof against either its existence or its strength. The muscles of fishes and the pectorals of many fowls are both notoriously strong, yet white; and that it is furnished with a strong vortex of muscular fibre around its fundus, I think an inspection of it will prove, as well as the testimonies of many anatomists, that the balance of power rests eminently with the recipient orifice and insensible portion. On the objection taken, that other cavities furnished with cuticle are not comminutive, I think nothing need be offered; neither does it, I imagine, form any just objection to this view of it, that grain is occasionally passed whole; it is not pretended that perfect trituration is here performed; but a moderate pressure only on the contained grain, not even sufficient to destroy the actual form of the seed, or to grind its envelopment, yet fully sufficient to destroy the organization of the contained farina, and reduce it into a pulp. Neither would it militate against this argument, that grains do pass even whole, and so little acted on as afterwards to germinate, seeing that a rapid and incomplete mastication is very common with horses, and an incomplete digestion not uncommon also, by which a few grains may escape the united processes. Trees, shrubs, and vegetables, are every day planted by the imperfectly digested seeds dropped in the dung of birds, who have a real mill to grind their corn. The subject, however, after all, is more interesting than important; and its interest is not decreased by the ingenuity of the arguments used by Mr. Percivall against it, as well as some facts connected with his experiments.

[†] Regurgitation must not be confounded with vomition; although they are, by the actions of the organs concerned, but modifications of each other. Regurgitation is altogether a natural act; vomiting is never wholly so: the regurgitation of the ruminant is effected as a necessary part of its economy. The œsophagus is framed by its organization to assist it; it is powerfully muscular, much more so than that of the horse, whose layers of fleshy fibres are an external longitudinal, and an internal circular; whereas, in neat cattle, the œsophageal plans are both oblique, and thus can both dilate and shorten the tube, either to permit the entry of the aliments, or to assist their return: but, naturally, the horned ruminants never vomit: and if they have not the structural hindrances of the horse, their diffused gastric cavities are a sufficient impediment.

[‡] *Vomition* exists in some animals, as the canine and feline tribes, where regurgitation is the natural, and vomiting an occasional and forced act. The dog swallows a large quantity of food at a time; and either by a partial deposit, or by delaying the process of digestion, he keeps it until he has found a hiding-place, when he regurgitates a portion or the whole: this must have been witnessed by most persons who have had bitches with their whelps in their possession. Vomition is certainly encouraged by the dog, who eats an emetic grass for the purpose; but the act is altogether a different one to that of regurgitation, as must be evident to any one who observes it. In regurgitation, the matters seem either not to have entered the stomach, and to have occupied the cavity only, which we have described as existing around the œsophagus to favour its distention; or otherwise, by some capability in the stomach, it is received and retained at its very entrance: for its regurgitation is without effort, and the abdominal muscles are hardly called into action at all. Vomition, on the contrary, in him employs the abdominal muscles most forcibly; and it seems designed, that he should have this means of relief at hand, seeing his stomach is placed so as to be immediately within the sphere of their action, which, it has been shewn, is so necessary to the act, that, without their aid, attempts may be made, but are ineffectual, in procuring vomition. Still it is to be remarked, vomition is an act of necessity from morbid excitement; and though instinctively encouraged, is conducted with violence and some pain. I have purposely introduced this matter, as illustrative of one of the hindrances to vomiting in the horse, his stomach being wholly removed from any pressure by the abdominal muscles.

tyles, have occupied much attention among our indefatigable neighbours the French: and we find ranged in the list of experimentalists, and arguers thereon, Lamorier, Bertin, Bourgelat, Girard, Fromage de Feugré, Dupuy, Vatel, Berthe, and a host of minor satellites[*]. The whole of the gastric portion of the alimentary canal exhibits a structural uniformity of intention, unfavourable to regurgitation or vomition. The membranous curtain of the palate closes all return of the contents of the stomach by the mouth, except under the most violent efforts; and consequently when vomition does occur, it is, in most cases, confined to the nasal openings, or, in other words, the matters thrown up come out by the nostrils. The next structural impediment may be observed in the œsophagus, which, by being much less muscular than that of the ruminants, and having a different arrangement of its muscular fibres, evidently proves that regurgitation formed no part of the natural economy of the horse. The obliquity of its insertion, and the number, strength, and direction of its fleshy layers, are powerful impediments; and if they do not actually constitute a valvular apparatus, by the addition of the rugose folds of the cuticular, or a sphincter by the power of the contraction, they must form a sufficient bar to all ordinary tendency of the aliments to return. And if it be, as already stated, that the true peristaltic. motion be confined to the villous portion, and the compound undulatory one be proper to the left or cuticular half, we have sufficient reasons for the inaptitude of the horse to vomit: for were we to suppose nausea to be sufficient to produce attempts of the kind, the superior resistance offered by the greater volume of muscular matter around the cardiac than the pyloric extremity, must, in all general cases, prevent it. Vomition may, therefore, be considered altogether unnatural to the horse, and the formation of his organs evinces the intention of Nature to be such: but it is to be remarked, that no actual impossibility exists to the act itself, neither to the state of nausea which is the usual precursor to it; for both have occurred sufficiently often to make their capability notorious; but in every instance they are forced by extraordinary circumstances of irritation. M. Hurtrel d'Arboval thus describes the manner of vomitting in the horse:—'Quoi qu'il en soit, le vomissement, dans le cheval, est généralement précédé de quelques nausées, mais il ne les suit pas toujours. Au moment de rendre des matières, l'animal se raidit sur les quatre membres, allonge la tête et le cou, comme il a éte dit, ramène le menton vers le poitrail, fait une grande inspiration, contracte les muscles abdominaux, et on le voit expulser par les naseaux, rarement par la bouche en même temps, un liquide jaunâtre, verdâtre, acéteux, mêlé d'alimens mal élaborés, tantôt deliés, tantôt réunis en petites pelotes, tantôt en petite quantité et tantôt à pleins naseaux. Le cheval qui vomit secoue la tête et fait une fort expiration. Le plus souvent il ne vomit qu'une fois; cependant on a vu les efforts se renouveler, et le vomissement se répéter plusieurs fois, après des intervalles plus ou moins rapprochés ou éloignés.'

DESCRIPTION OF PLATE V.

This plate represents the stomach and intestines taken out of the body, the stomach being cut open to shew its inner surface and cuticular coat. *a*, the cardiac, or recipient orifice, with the œsophagus cut off; *b b*, the circular plan of fibres, which give great force to the cardia, and prevent the return of food. This plan is seen directing its course into

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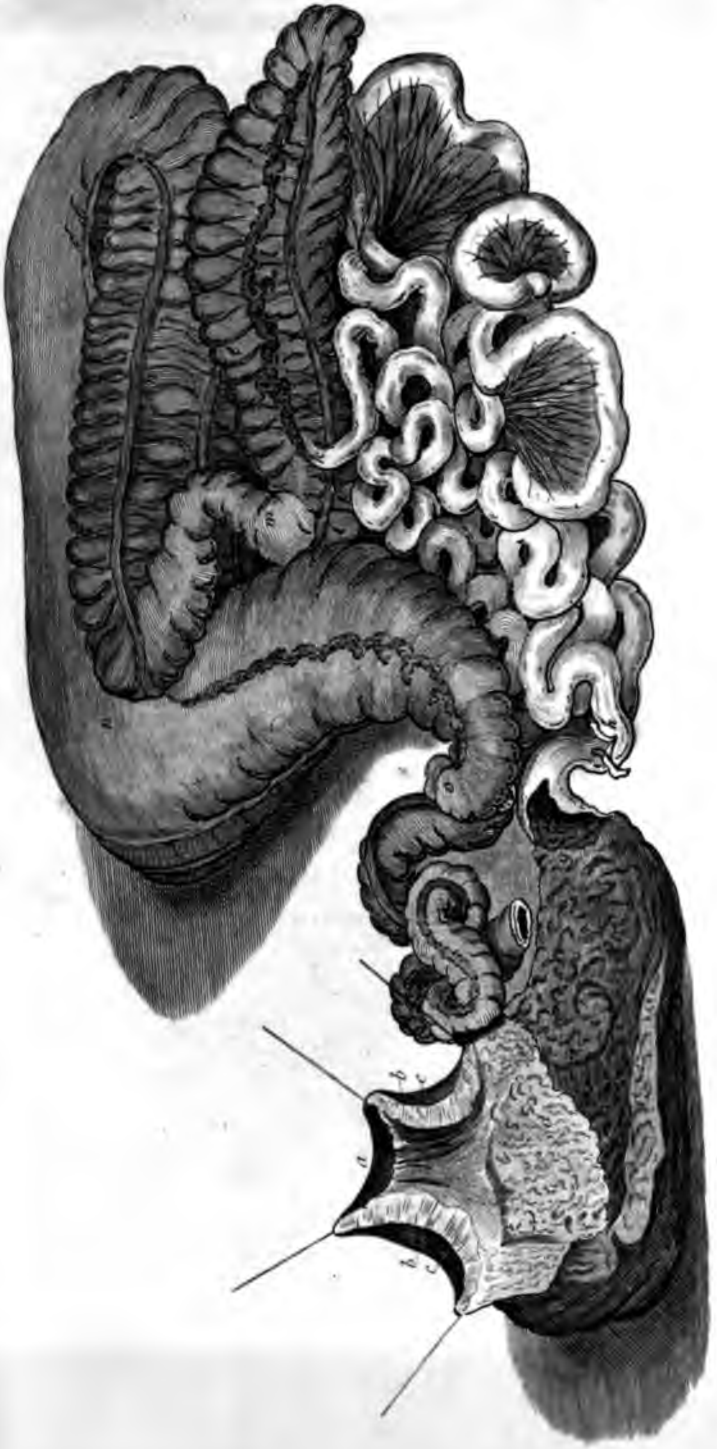
[*] Lamorier attributes the æquine inaptitude to vomit to the want of muscular force in both the œsophagus and stomach, but more particularly to a valvular apparatus at the cardiac orifice, as well as to being out of the sphere of pressure from the abdominal muscles.—Bertin admits that a sphincter-like apparatus is found at the cardiac termination of the œsophagus, but he denies its being valvular. He attributes much to the obliquity of the insertion of the œsophagus, and to its placing in the lesser curvature, somewhat remote from the left extremity of the stomach, as well as to three distinct plans of fleshy fibres, which he finds surrounding the fundus of the stomach.—Bourgelat observes, that the muscular construction of the cardiac orifice is such, that the general propulsive action of the stomach only increases its constriction, and that, even were the peristaltic motion reversed, the powerful fibres of this part would resist the action of vomiting.—La Fosse thinks that no case of vomition can occur without rupture of the stomach; even at his time of practice we cannot but wonder at a conclusion so vague, and so adverse to established facts.—Girard, who has written largely on the subject, and has evidently paid it a minute attention, advances, that three essential obstacles to vomition are found in the horse. 1, A muscular enlargement of the gastric extremity of the œsophagus, as well as a species of inward protrusion of a fold of the cuticular lining, which has been mistaken for a valve to the orifice. 2, The situation chosen for the entrance of the tube, which is that of the lesser curvature. 3, The oblique course it takes in piercing the viscus, which although not so well marked, yet is after the same manner as that by which the ureters penetrate the bladder.—Dupuy observes, 'Le passage de l'œsophage au milieu du pilier droit du diaphragme doit être mis au nombre des causes qui s'opposent au vomiscement dans le cheval.'—Berthe has observed a partial vomition to be not uncommon among cribbiters, in which cases much viscous mucous and alimentary matter has been thrown out by the nostrils, which induces him to suppose it connected with indigestion. But this appears to be altogether an unfounded conclusion; and I strongly suspect that in these cases, as well as in some others, much alimentary matter occasionally remains in the pharynx until its accumulation irritates the larynx, when it is, by a convulsive effort, thrown out by the nostrils.



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the fundus, or great extremity: *c c*, the longitudinal plan, also carried over the fundus; *d*, the cuticular surface of the great extremity of the stomach, called its insensible part: its rugæ, or folds, which are small, are shewn on this surface; *e*, the villous or membranous portion of the stomach, or its vascular and sensible part: its folds are seen larger than those of the other portion: *f*, the external part of the great extremity; *g*, the pylorus, or pyloric extremity of the stomach, presenting a valvular duplication of its membrane, to prevent the too hasty passage of food through it; *h*, the duodenum, with the biliary and pancreatic ducts entering it; *i*, the mesentery; *k*, the small intestines ending in the cæcum; *l*, the cæcum, with its blind end shewn; *m*, the commencement of the colon by a contracted portion; *n n*, the continuation of the colon, with its membranous bands, and its sides thrown into cells; *o*, the termination of the colon into the rectum, and of the rectum by the anal opening.

The Intestines.

The remainder of the alimentary canal is continued from the expellent orifice of the stomach to the anus, or end of the passage; forming a long canal, whose varying dimensions have occasioned it to be divided into the large and small *intestines**. The length of the tract ranges between twenty-seven and thirty yards; of which proportions the small intestines occupy from twenty to twenty-two yards, and the large from seven to eight. It is not easy to give a determinate place to the intestines, either individually or generally; the large, however, may be said to occupy all the inferior portion of the abdomen throughout, and the small to range between and upon them; both occasionally shifting their position somewhat by the peristaltic motion. They are, however, prevented from an unnatural displacement, by membranous productions of the peritoneum, under the name of mesentery, mesocolon, and mesorectum. The first intestinal coat is derived from the peritoneum, which separates to receive the tube between its lamen: at once protecting it, and affording a medium for the transmission of its vessels and a lubricating surface. The second, or muscular coat, presents a longitudinal and a circular plan of fibres; by the contraction of which the vermicular motion, called *peristaltic*, is performed, the longitudinal slightly shortening them, and the circular diminishing their diameter: the inner surface of this fabric being garnished with a quantity of dense cellular tissue, was formerly erroneously considered as another and a nervous coat. The inner tunic of the intestinal canal is villous or mucous, and is very vascular and sensible, its villi presenting an increased surface for the mucous secretion, as well as more numerous chyliferous orifices with which it is thickly studded: but it presents no valvulæ conniventes, as in the human, their place being supplied by the increased length of the tract.

The *duodenum*, the first portion of the small intestines, commences from the pyloric orifice of the stomach. It hangs loose and pendulous, being attached to the concave surface of the liver, from which making a turn, it becomes fixed to the vertebræ, and then takes the name of jejunum; but as in this course its length is nearer twenty inches than twelve, it is evident that duodenum is an improper term for it in the horse. It appears rather larger in circumference than the other small intestines, and more vascular, but it is peculiarly remarkable for having the pancreatic and biliary ducts obliquely penetrating it, which they sometimes do by one common orifice, and as often by distinct ones, about five inches from its commencement. (Vide *h*, *plate* V.) The *jejunum* gains its name from being commonly found empty, and is attached to the mesentery, which follows its circumvolutions; the line of division between it and the ilium is only imaginary: it is usual to consider rather more than a third of the joint length to belong to this intestine, and something less than two-thirds to the next. The *ilium* occupies a portion within the iliac region, from whence it derives its name: it presents no peculiarities of structure; but, equally with the former, its circumvolutions are all connected by the windings of the folds of the mesentery to its termination in the cæcum.

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* In man, and most carnivorous quadrupeds, there is but little disproportion between them; but in the horse it is very great. Our knowledge of the nature and economy of an animal may be in a great measure gained by a mere inspection of his intestines only: for, as a general principle, it is found that the length and capacity of the alimentary canal are in proportion to the difficulty of assimilating alimentary principles from the various matters used as edibles. The tract is, therefore, larger and longer in the herbivorous tribes, less in the omnivorous, and least of all in the carnivorous.

The *large intestines* differ widely from the small in structure and appearance as well as in size, having their large volume contracted by membranous folds into distinct compartments which lodge the alimentary contents, and prevent their too hasty egress. The *cæcum*, or blind gut, as it is called, is the first of them, and it might with propriety be considered as a mere appendage to the colon. Into this the ilium terminates, by protruding itself some way within the cavity, by which is formed the *valvula colli*, which prevents the return of the contents of the cæcum. From this the anterior part of the cæcum projects forward nearly three feet, in a pocket-like form, of the size of the colon (vide *l*, *plate* V). It usually occupies the right side of the abdomen, and appears immediately on opening the peritoneum: commencing from the colon and ilium in the right iliac region, it extends forwards to the right side, with its pocket-like part applied towards the diaphragm and liver near the xiphoid cartilage: the horse has no appendix vermiformis. Through the peritoneal covering, we observe three or four muscular longitudinal bands, extending from its extremity along the muscular tunic, so as to divide the gut into three portions; between these fræna the internal membrane is plaited up, and its intersections form elliptical cavities called the cells. From this gut being frequently found with a considerable quantity of water in it, it has been conjectured to be a receptacle for fluid, and fluid only; but it is not always furnished with water, and I have also found the solid ingesta as well as the fluid within it.

The *colon* is small at its origin, as may be seen by a reference to *plate* V, vide *m;* but soon enlarges its bulk greatly, and in convoluting itself round the abdomen it makes five considerable turns or flexures, which are principally found in the lower parts of the belly. After its second flexure, which is the most considerable, it presents a contracted portion attached to the spleen: from which, enlarging again, its volume makes two other tortuous reflections backwards, which form its *sigmoid flexure;* when again contracting at the sacrum, it becomes the rectum. These massive turns, and which form a bed for the small intestines (*n*, *n*, *plate* V), are, though apparently free, yet steadily bound to circumscribed limits by peritoneal elongations: they are also internally furnished, like the cæcum, with ligamentous bands whose intersections produce unequal cells; and is altogether sustained in its situation by that portion of the mesentery termed mesocolon. The colon and cæcum are the principal sufferers in those inflammations that arise from violent purging medicines.

The *rectum* is the continuation of the colon (vide *o*, *plate* V), and passes backwards from the lumbar vertebræ to the anus. Its substance is thicker than that of the other intestines; and though it is not longitudinally intersected by muscular bands, still it presents a plicated appearance, and is puckered into small cell-like depressions, to prevent a too frequent expulsion of the fæces. The rectum is attached to the spine and sacrum by a detachment of the peritoneum, which is here, therefore, called mesorectum: but the true lamen of peritoneum does not invest its whole portion, but leaves it as it approaches the gut, its place being supplied by cellular membrane, which forms strong attachments for the terminal portion of it to the coccygis. The *anus* is opened by the force of the peristaltic motion and the consent of part, and is shut by a muscular band around the extremity of the gut, called the sphincter; it is likewise elevated and retracted by two pair of appropriate muscles.

The *mesentery* (vide *plate* V).—This great folded membrane is a prolongation of the peritoneum, within which the intestines are involved: these investing laminæ uniting at the superior part, form a single membrane, called *mesentery*, and which are of different lengths, as the intestines are protruded farther or less within the great bag. These peritoneal prolongations are very useful, for they not only invest the intestines, and give them their outer covering, but they attach them likewise within their situations, and furnish a medium through which they receive their bloodvessels and nerves: the lacteals also are situated and sustained within these membranous folds. The origin of the mesentery from the spine is of small extent, but it is so framed, that, as it proceeds, it is enabled to follow the whole of the intestines through their course, branching out like a fan, from its beginning at the duodenum to its termination at the rectum: that portion of it which sustains the small intestines being called the *mesentery;* that longer part attached to the colon, the *mesocolon;* and the *mesorectum* that more inconsiderable portion which attaches the rectum: its laminæ contain a larger or smaller quantity of adeps, as the animal is more or less fat in general. The mesenteric vessels and nerves have been already described with *Angiology* and *Neurology*. The mesenteric glands also have been noticed as part of the absorbing system, where also the lacteals have been considered.

The *diseases* of the intestines are very serious, as might be expected from their great vascularity: the acute peritoneal inflammation called *enteritis* is a most rapid and fatal one. Their muscular structure is also very frequently affected by spasm or colic: calcular concretions form within them; strangulation occurs; and they are occasionally subjected to diarrhœa, and a species of dysentery also.

The Physiology of the Intestines and remaining Chylopoietic Viscera.

The intestinal canal receives the pulpy mass of the chyme in a somewhat partial state of digestion, but, becoming mixed in the duodenum with the pancreatic and the biliary fluids, fresh changes take place in it[*]; and the chylification is by these accessions more perfectly advanced, and the chyle more completely animalized. The mass is continually propelled onward by the creeping muscular contractions of the intestinal tract, called their *peristaltic motion*, which appears to be operated by two orders of muscular fibres; a longitudinal straightening the convolutions, and steadying them; while a circular order, in its progressive contractions, presses the contents onwards, not by continued but by gentle efforts, renewed after the lapse of a short time. This motion is not altogether uniform, either in direction or duration; on the contrary, it sometimes acts inversely; occasionally it halts altogether, and often is irregularly agitated. That this propelling force may not hurry the contents too fast, a cellular arrangement throughout exists, evidently intended to delay the chyme within the intestines till the whole of its nutritive parts are taken up. The powers of the horse requiring a very complete chylification, he is furnished with a long and large alimentary tract; and whereas in man, and many quadrupeds, little more is effected in the large intestines than fæcation, in the horse there is reason to believe that not only a considerable chylous absorption occurs, but that this mucous surface adds much to the nature and quality of it also[*]. The *chyle* is separated from the digested mass by the agency of the lacteals, whose orifices, abundantly spread over the villous surface of the intestines, receive it, and, directing their course through the mesenteric lamen, deposit it in the chylous receptacle, to be mixed with the blood. (See *Absorbents.*) And by which means an increase to its *quantity* is acquired, as by the act of respiration its *quality* is restored. The intestines own a high degree of irritability, which in its natural state produces their vital phenomena, and in its deranged state some of their most fatal diseases. The stimuli of the intestines are various; food is the most ordinary, and it is generally supposed to have its activity increased by the biliary secretion[†]. Exercise is also a natural stimulus, as well probably by the increased absorption of oxygen occasioned, as by its mechanical pressure[‡]. The application of particular substances stimulates them remarkably, and are thence called purges[§].

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[*] What these changes are, has long been a subject of dispute among physiologists. The pancreatic secretion, in chemical characters, is not unlike saliva, and has had a solvent power ascribed to it, which it is probable it may possess; but that it is not absolutely essential to life we know from the circumstance of dogs having survived the loss of communication between it and the duodenum. The biliary secretion seems to be more essential to the process of digestion, although it is affirmed that chylification has proceeded without it; but this is at variance with the experiments of Mr. Brodie, who on applying a ligature so as to obstruct the ductus choledochus of cats, found that, although the production of chyme in the stomach proceeded as usual, yet the conversion of chyme into chyle was invariably and completely interrupted. The bile, as an assistant to chylification, has been supposed to separate itself into two parts, a serous and a resinous one; and that the former was essential to the production of chyle, while the latter united with the fæces, and was ejected by them as excrementitious.

The Liver.

The *liver* is so bulky and ponderous a mass, that there seems great wisdom in placing it in the centre of the body. Anatomically its larger part is situated in the left hypochondrium; a smaller portion in the right (vide *b b*, *plate* IV), and a third in the epigastrium; in circumference extending between two and two and a half feet; thick towards the middle, but thin at the edges. It is divided into two large and several smaller lobes, which are again further divided by notches or deep indentations, the principal of which sepa-

[*] The cæcum of the ox is much larger than that of the horse, but his colon is less capacious, by which an equal degree of detention of the contained matters is brought about. It is the opinion of some French and English æquine anatomists, that the cæcum is principally destined to hold the fluid aliments. Mr. Percivall observes, that in most cases he has found little else than water in it; and it appears to be his opinion, that as the stomach has not the capacity, functionally nor yet structurally, as regards its bulk, to retain the water taken in; so the cæcum is the reservoir appropriated to that purpose; for it is argued, were it to be passed into the colon with the general aliments, they would be too much diluted by its means, and constant diarrhœa would be the consequence. There appears much to persuade us of the truth of this view; but it is somewhat against it, that the ox, who has a larger cæcum than the horse, drinks much less, and also that in the ox the pultaceous mass is very generally recognized in this intestine. On the other hand, the horse exhibits so many specialities of structure in accordance with his powers, and other animals, as the camel, &c. present diversities so remarkable to supply the wants of their system, that it is not easy to deny such an intention.

[†] Some modern physiologists deny that bile is the natural purge of the bowels; alleging, that were that the case, we could not ourselves so frequently suffer under a state of diarrhœa when the cystic bile is obstructed; but this is not cogent, seeing there may be other morbid agencies acting on them at the same time; and also that we do know that the deficiency of it in obstructions does more frequently produce costiveness than diarrhœa.

[‡] The contractions of the abdominal muscles in exercise have a very great effect on the bowels; thus we exercise horses briskly to promote the process of '*physicking;*' and thus it is that hard riding immediately after a full meal, promotes a too early and unassimilated state of the contents of the bowels: in such horses as have little capacity in the abdominal cavity ('small carcassed or badly barrelled') this is of course greatly aggravated; and they are thence termed, from their early and liquid evacuations, '*washy horses.*' We should therefore remember, that in all, but more particularly with such a one, it is proper to let digestion proceed some length when baiting on a journey before we move the horse, or his chyme will be propelled before the chyle can be taken up; and thus he will reap only the benefit of a cordial, which, as it acts by sympathy, is merely temporary; but the permanent benefit resulting from an increase of blood will be wanting; and hence it is that horses flag under injudicious management, who, under a different treatment, would continue strong and equal to what is required of them.

[§] When we consider the length of the intestinal tract, and the horizontal situation of the horse, we cannot wonder either at the time taken up in the process of purging horses, or the quantity of purgative required to effect it. The extreme vascularity of these organs shews us why drastic purgatives so readily inflame them; and their nervous connexions with the stomach equally inform us why horses 'under physic' are so often 'off their feed.' A physiological inference drawn from what has appeared will inform us why horses who habitually purge, seldom thrive.

rates the two large lobes, and is called the *great scissure:* within this may be seen the remains of the fœtal umbilical vein, the tract of the vena cava and œsophagus; while a smaller indentation, seen about the centre of the concave surface, forms the portæ. By its convex surface the liver is attached to the diaphragm by productions of the peritoneum, which being also reflected over it by its cellular tissue, sustains its outer form and its inner granular structure. Numerous lymphatics run over its surface, and the vascular rami which enter its *portæ* pass within a sheath called Glisson's capsule. Its principal bloodvessels are the vena portæ, vena hepatica, and arteria hepatica. Its nerves are derived from the hepatic ganglia, and communicating rami from the sympathetic are also received by it.

Vena portæ hepaticæ.—The circulation of the venous blood in the liver of the horse presents a remarkable speciality, as may be gained by what follows. I have already described the veins of the abdominal viscera, as returning their blood into the sinus of the vena portæ, which may be regarded as the termination of that portion called *vena portæ ventralis*, and the beginning of that termed *vena portæ hepaticæ;* from whence this venous trunk being branched off in every direction to be ramified throughout the substance of the liver, necessarily performs the office of an artery.—*Hepatic veins.* The blood being circulated through the substance of this viscus, and acted on within it, is collected from the terminations of the vena portæ and hepatic artery, whose several rami thus form the hepatic veins, and pour their blood into the cava by numerous branches.—The *hepatic artery* arises from the aorta; and it is to be remarked that, though it furnishes so great a viscus in vascular capacity, it is yet much smaller than either of the emulgents: it can therefore yield little more that support to the liver, and cannot afford much towards its secretory office.

Pori biliarii, and *hepatic duct.*—In the glandular corpuscles some great change goes on, by which a fluid substance is separated from the blood*. The biliary pores appear to end in small tubes, which unite to form the *hepatic duct*, as may be seen by turning up the right lobe. (See *c*, *plate* VI.) As it parts from the liver, it accompanies the hepatic artery, and passing below the vena portarum, it terminates, as has been already described, in the duodenum, about five inches from the pylorus†. The *diseases* of this organ are, as may be supposed from its simplicity of structure, not numerous or very important. Its gall duct is not often obstructed, although in olden times nine sick horses out of ten '*had the yellows.*' Hepatitis now and then occurs, and it has been found tuberculated‡.

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* It is not yet determined whether bile be secreted wholly from venous blood, or in part only; the diminutive supply forbids the presumption that it is formed from the blood of the hepatic artery; and yet two cases in human anatomy have shewn the strange anomaly of a want of the vena portarum: the vein corresponding to it ended in the inferior cava, while the hepatic veins terminated in the cava; the hepatic artery was very large. Here the presumption is, that the bile was furnished wholly by arterial blood. It is probable that bile is eliminated from both; for injections prove, in the words of Majendie, 'that all the vessels of the liver, venous, lymphatic, and excretory, communicate with each other.'

† The entrance of the biliary duct has had more importance attached to it than it seems to deserve. In some animals it invariably pierces the duodenum solitarily; at others, one orifice common to it and the pancreatic duct is seen; but in every instance there is a distinct internal orifice, by which the peculiar secretion is observed to flow, and each presents its separate valvular apparatus to prevent the entrance of foreign matter. It was an opinion that the proximity of the entrance to the pylorus marked the carnivorous character, but which is now known to be fallacious.

‡ In the ruminants, tubercles on the liver, and their consequences, are much more

The *physiology of the liver* has been already detailed with that of the intestines; it remains, therefore, only to observe, that the anatomical account rendered, shews that in the horse there is no gall-bladder or biliary receptacle[**], and consequently that his bile is uniformly flowing, which was necessary to him, seeing that his habit of frequent feeding required as frequent a supply of all the digestive adjuncts.

The Pancreas.

The pancreas is a conglomerate gland, of a very irregular figure, lengthened out into three processes, which extend it across the spine in the epigastrium between the stomach and left kidney (*vide f, plate* IV). Its superior surface is applied to the abdomen, and its inferior to the great curvature of the stomach; it is also connected to the omentum, liver, duodenum, spleen, and, by its small appendicular portion, to the duodenum. From its substance small tubuli collect into one common duct, which penetrates the duodenum, sometimes immediately with, and sometimes distinct from, the biliary. Its use has not yet been satisfactorily explained[*].

The Spleen.

The *spleen*, or *milt*, is a viscus of a soft and apparently glandular structure, but without an excretory duct; its colour is that of a rusty brown, inclining to blue, but both that and its size are variable. In shape it resembles a very lengthened triangle, and is consequently very dissimilar to that of man. (*p, plate* IV.) Its texture is spongy, and so tender, that were it not for its peritoneal covering, it would be liable to become torn by slight causes. By its upper convex surface it is attached to the ribs, and to the left extremity of the stomach: inferiorly it rest on the abdominal viscera. It is plentifully supplied with bloodvessels, absorbents, and nerves; the two former particularly: but its use is altogether conjectural[†]. It is seldom idiopathically inflamed, although so eminently vascular; but its spongy tex-

frequent than in the horse. It is also the peculiar seat of intestinal worms in many quadrupeds: out of eighteen rats that were examined, sixteen were found with tænia within its substance. The disease termed the rot in sheep appears to arise from a species of worm within the gall duct, and Monsieur Chalette professes to have often found them in horses also. In cattle they are occasionally met with, and it may be observed that parasitic animals are found within the substance of this organ and its ducts throughout every part of the animal kingdom.

[*] We know little more of it, than that its structure is not dissimilar to the salivary glands, and that its secreted fluid resembles saliva; from whence it may be supposed, like that, to be intended as a diluent to the aliments, and without doubt as an assistant to chylification; but not altogether an indispensable one, as its secretion may be cut off without any marked injury to the digestive process. Its structural similarity in calves to the thymus gland is such, that both are called and both are used by cooks as the *sweetbread.*

[†] The volume of blood received by this organ, and the systematic detention of it, without any secretory outlet, has naturally excited a suspicion that it was an occasional reservoir for that fluid: others have supposed that the blood within it was there prepared for a more ready separation of the bile. Dr. Haighton's experiments on dogs tended to shew it as a digestive agent, by pouring out its contained blood for the use of the stomach when functionally employed: but the situation of the splenic vessels in the horse being less favourable to *stomachic pressure*, on which this ingenious theory was founded, weakens its probability. The experiments of Sir E. Home tend to shew that splenic blood is more serous and less disposed to coagulation than other blood.

[**] The regularity of the biliary supply, though convenient and probably necessary to the horse, will not however wholly account for the absence of a gall-bladder in him, seeing that it is a peculiarity which he owns in common with all the tardigrade, and many of the saltigrade animals. Neither are granivorous habits essential to it, for it is also absent in the elephant, rhinoceros, camel, and dromedary; while in man, the ox, sheep, hog, and dog, a gall-bladder is always found. In some of the former, however, a dilatation of the duct is observable, and is not uncommon in the horse also, which may in some measure answer similar purposes.

ture has subjected it to rupture, and its structure to a species of scirrhous enlargement, particularly in dogs labouring under asthma: it has also been found ossified to a considerable degree.

The Renal Capsules.

These (sometimes called *super-renal glands)* are two irregularly shaped bluish-brown bodies, situated each in front of its respective kidney, as seen in *plate* IV, *m*, *m*. Their size in the young subject is very considerable, but lessens remarkably as age advances; internally they seem composed of two substances, one a dirty yellow-coloured compact vascular part; and one more central, less in quantity and more spongy in texture, from which in the young colt a fluid may be pressed out. They derive their blood generally from the emulgents, and occasionally from the aorta; their nerves are gained from the renal plexus, but their functional purpose is wholly unknown*.

The Kidneys.

The kidneys are two glandular bodies (vide *c c*, *plate* IV) situated in the lumbar regions, at the superior and posterior part of the abdomen; the right being generally the most anterior, and attached to the posterior margin of the right lobe of the liver, under the sixteenth or seventeenth rib; while the left is pressed backward by the spleen, and is therefore usually situated under the last false rib. The kidney bean, so named after these parts, serves to give a pretty exact idea of their shape; but which is not uniformly the same in every horse. The central notch offers an entrance and outlet to its vessels, secretory as well as nutritive. In many brutes, as the hog, ox, and sheep, these organs are imbedded in a very large mass of fat, known as *suet;* but in the horse, dog, and most animals designed for accelerated motion, the quantity is less considerable. They are sustained in their situation by cellular investure by their vessels, and by the peritoneum, which passes over their inferior surface; but as it does not wholly cover them, and is not again reflected over them, they cannot be said to be within its sac. In the fœtal colt the kidneys are lobular or conglobate; in the adult they are uniform or conglomerate; and when cut into present three distinct portions. The *cortical* or outer part is of a dull red, moderately compact, and dips by intersections into the medullary substance; the cortical mass may be regarded as the ramifications of the emulgent arteries, from whence the secreted urinary fluid is first derived. The second or *tubular* part is lighter in colour than the last, and presents radiating fasciculi, which collect into minute cones or *papillæ*, and from thence are formed large canals, or *infundibula*, which, being eventually combined into three common outlets, present a central uniform cavity called the *pelvis*, whose funnel-like termination forms the *ureter*. The blood-vessels of the kidneys are so large as to be supposed to carry one-sixth of the whole blood of the body to and from these comparatively small organs. The large trunks of the emulgent arteries (see *plate* IV) emerge at right angles with the aorta, immediately behind the anterior mesenteric artery; by which origin the motion of the blood is rendered slower, for the benefit of secretion: the left is much shorter than the right, from the inclination of the aorta to that side; each trunk penetrating its kidney by two or three divisions. The *emulgent veins* arise from the venal terminations of the artery, and follow the direction of the arteries. The *renal capsules* are two, a right and a left, in an opposed situation to the kidneys, exhibiting internally two substances, from which a yellowish fluid may be pressed out, the use of which is unknown. The nerves of the kidney are furnished from the renal plexus, and its lymphatics are seen accompanying the emulgent veins.

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* Although no direct communication can be discovered between these bodies and the kidneys, yet their mutual connexion is marked by the variations in structure which take place in different animals, and which are always consentaneous. Thus in the kidney of the elephant, in which the cortical and medullary substances are distinct, the substances of the renal capsules are so likewise; but in birds, whose kidneys present an uniform structure, and want the distinctions of medulla and cortex, the renal capsules do the same. The researches of some continental anatomists shew a remarkable sympathetic connexion between them and the sexual organs.

The ureters (*n n*, *plate* IV), each of them passing out at the posterior part of its appropriate kidney, is continued backwards, inclining towards the bladder and each other; when, becoming connected with the ligamentum latum, they travel with it to the upper part of the bladder; and finally insert themselves at some distance from each other within that viscus, not far from its neck, piercing the coats obliquely, and running between them for a short distance; thus performing the office of a valve.

The Pelvis.

That part of the abdomen which is included within the ossa innominata and sacrum is called the pelvic cavity; the posterior portion of which is not within the peritoneal cavity, nor are all the pelvic viscera within its investure, as will be seen.

The Bladder.

This is a membranous and muscular sac of a pyriform shape under distention, but firm and globose when empty; in which state it is wholly within the cavity of the pelvis, but stretches beyond the pubis when distended, and may be then felt in the belly*. It will contain several pints of urine, but is usually stimulated to a more early evacuation. It presents a base, which is its central portion, and an anterior and posterior apex; it is surmounted by the rectum in the horse, and the vagina in the mare. The bladder is attached to the parietes of the pelvis by the peritoneum, which forms its ligamenta lata, by first girthing its upper surface, and then reflecting itself backwards, to form a more complete covering to this anterior portion; being superiorly reflected from the bladder over a part of male rectum and female vagina. The bladder has two perfect tunics, and the peritoneal investure, which it has been seen furnishes only a half of it. The outer is the muscular coat, whose fibres, longitudinal, transverse, and oblique, adapt it for uniform and complete contraction. The inner side is the villous or mucous coat, from the vascular surface of which a mucus is secreted, to defend the organ from the irritation of its contained fluid. At its posterior part the bladder is pierced by the ureters in the manner stated. The neck of the bladder, which is certainly surrounded by faint traces of a muscular band, or *sphincter*, is afterwards continued under the name of *urethrà*, as will be seen hereafter.

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* It will therefore be evident that there is a portion both of the bladder and rectum without the peritoneal cavity, which it behoves the veterinarian to be aware of, as, were it necessary to puncture the bladder, it might be done through the rectum, without entering the peritoneal cavity.

The arteries of the bladder arise from different branches of the internal iliacs; the venal trunks return their blood into the internal iliac veins; and the nerves are given from the sacral and abdominal plexi.

The Physiology of the Urinary Organs.

In consideration of this subject it may be asked, what is the nature of the fluid secreted? what phenomena attend its formation and ejection? and what practical hints can we derive from the inquiry? Urine may be considered as a separation from the blood of its superabundant serous diluting portion, operated by the agency of the kidneys; which organs therefore appear somewhat united with the skin, and with the exhaling bronchial surfaces, in the common office of fæcal outlets to the vascular system[*]. But of these it may be remarked, that the urinary excretion is the most compounded[†], holding in suspension, in addition to its other chemical constituents, a remarkable one, termed *urea*[‡], on the presence of which, it has been supposed, much of the renal functional purpose depends. Urine in colour is yellow, of a lighter or deeper tint; at some times it is transparent, and at others turbid in the extreme; in flavour it is more or less saline; its odour is peculiar, always pungent, sometimes offensively so, at others rather fragrant; but its compounded qualities subject it to early decomposition and separation: its specific gravity is somewhat greater than that of water. Both its quantity and its quality are very variable, and very much under the influence of circumstances[§]. The *phenomena* attending the formation and ejection of urine are numerous and important: one of the most interesting of these is the rapidity of its formation after liquid aliments have been received; and the very early detection in the urine of other matters taken into the stomach, which long ago led to a supposition that there must be some more direct communication between the stomach and kidneys than the routine of circulation. Mr. Brande, Sir Everard Home, and others, are of that opinion, but the nicest research has failed to detect it[||]. The regu-

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[*] It has long been a matter of observation, that the kidneys and skin have a great sympathetic connexion and great uniformity of action; and that, in a minor degree, the same exists between them and the lungs also; thus the inhaling of some substances will taint the urine. With the skin the connexion is most intimate: in winter, when the perspirable matter thrown off is trifling, urine is evacuated in greater quantity. In summer, on the contrary, these positions are reversed; and if the perspiration be further increased by violent exercise, the urinary flow becomes still further lessened. The renal secretion has been supposed to act with the skin in regulating the temperature of the body, by receiving the superabundant fluid particles, when not required for cutaneous transpiration. We have an experimental proof that the serum or watery parts of the blood are those taken up, by examining blood from both the emulgent vein and emulgent artery, when the venous will be found distinctly to contain the smallest portion of serum. But that there are other parts intended to be carried off beside the mere liquid ones, is evident from fowls, who have kidneys, but no urinary bladder: therefore in them the urine is deposited in the intestines, in a saline mass, which forms the white portion at the last extremity of their fæces.

[†] According to Fourcroy and Vauquelin, the urine of the horse contains in 1000 parts, carbonate of lime, 11 parts; ditto of soda, 9; benzoit of soda, 24; muriate of potash, 9; urea, 7; water and mucilage, 940. According to Mr. Brande, carbonate of lime, sulphate of soda, muriate of soda, benzoit of ditto, and phosphate of lime, were found in horse urine, in united quantities, to amount to one-eighth of the fluid. Mr. Brande could not find that the urine of the ass deposited any carbonate of lime, nor benzoic acid; but that it contained a much greater relative proportion of phosphate of lime and urea. It must however be remarked, that though we believe it to be formed wholly from the blood, it contains many proximate principles in the horse, as well as in man, not to be detected in the blood; these new products result from the chemical changes it undergoes in the kidney, and, notwithstanding this perfect elaboration, we cannot view without wonder its constant and large supply.

[‡] The kidneys cannot be designed as mere supplementary organs to the skin; the immensity of their supply of blood, and the pains taken to detain it, shew that they have a distinct functional office; and it has been supposed that through their means the system is relieved from its superfluous azote, as the lungs and liver serve the purpose of getting rid of the refuse quantity of carbon. This opinion is very much strengthened by our knowledge of a newly discovered salt in the urine, called *urea*. Dr. Prout informs us that urea is thus composed: hydrogen two atoms, oxygen and carbon one each; but that by removing one of the atoms of hydrogen, the urea is converted inso sugar; and by adding another atom of carbon, lithic acid is produced. It must, therefore, be remembered in our consideration of the composition of the urine, that urea and lithic acid are distinct substances, which distinctions are required as well in our pathological as in our physiological views; and, yet, that both urea and uric acid, being the most azotized of all animal substances, it amounts to a conviction that the separation of the excess of azote from the blood is the most important of the functional purposes of the kidneys.

[§] Its quantity may be increased at pleasure by giving an inordinate quantity of water after extreme thirst; but the flow does not take place in its full degree until the blood has absorbed its due dilution; then the staling becomes profuse: it is also increased by the nature of the food, as green meat, mow-burnt hay, &c. Many substances have an effect on its quality likewise: dry meat, as oats, beans, and barley, produce a scanty evacuation frequently; but it is, under these circumstances, invariably of a higher colour, and possesses a more acrid odour. Terebinthinated matters of all kinds increase it, and as certainly impregnate it with their effluvium. Mr. Percivall states, that in the balsam copaiba this property is singularly observed.

[||] The experiments of Majendie and others on venous absorption appear likely to account satisfactorily for this quick transit. The venous radicles take up every sort of gaseous or liquid matter larity of the urinary secretion is a notable phenomena; it is always going on, as well when sleeping as when waking: sensible perspiration is occasional only. Its accumulation in the pelvic cavity of the kidney forces it into the urethra, whose contractile power carries it drop by drop into the bladder, which becoming distended, flattens the ureters more effectually as the pressure of its sides increases. The complete distention of the bladder occasions an instinctive attempt at evacuation, but the act remains under the influence of the will, and is regulated by habit, the accession of stimuli, and opportunity. It is evident from the nature of its structure, and its globose massive state when empty, that its contraction is constant, yet that the urine escapes only at certain intervals. A continued flow of it would have been most inconvenient; nature has, therefore, kindly guarded against it by a temporary receptacle solely appropriated to that purpose.

The *evacuation* of the urine is thus correctly described by Mr. Percivall. 'The animal (supposing him to be in action) first stops, and places himself in a certain convenient position; he then takes in a deep inspiration, by which the diaphragm thrusts the abdominal viscera towards the pelvis, and keeps them pressing upon the bladder; lastly, still holding his breath, by the exertion of the abdominal muscles (particularly the transversales) this pressure is greatly increased, and, by the joint contraction of the muscular coat of the organ itself, is rendered available in its evacuation. It would appear from what we have learnt by experiment and from pathology, that these powers acting singly are insufficient to the end: if the bladder be paralysed, all voluntary efforts to discharge the urine are unavailing, and so are the contractions of the organ itself when the abdominal parietes are cut away[*]. During the continuance of the act the impetus of the stream may be increased at pleasure, or the current may be projected by jerks, as it commonly is towards the conclusion; the former is the effect simply of increased abdominal effort, the latter is ascribable to the superadded action of the accelerator urinæ. But a few drops make their appearance, or the stream is but small at first, in consequence of the time taken up by the voluntary powers in overcoming the opposition at the cervix of the bladder; but, when once this part is dilated, the urine flows in full stream, and continues to do so without further effort, as is seen by the relaxation of the flanks and the recommencement of respiration, the operation being continued by the bladder alone. Towards the end of the act the stream becomes again diminished, and the last portions of urine are so feebly expelled from the bladder, that their discharge from the urethra calls forth the contractions of the accelerator urinæ. Through this same muscle also the animal has the power of suddenly arresting or interrupting the stream during micturition, and of resisting an urgent impulse to stale; for it will so effectually compress the urethra, all the way from the bulb to its termination, that no effort the bladder can make can have any effect.'

The *practical hints* we derive from a consideration of the nature and properties of the urinary secretion are, that the extreme vascularity and sensibility of the organs are of such a kind as to render them particularly susceptible of increased action; and that, although in man and many quadrupeds we have little power over the secreting property of the kidneys, in the horse no medicaments are more certain in their operation than diuretics; to which it may be added, that few occasion more disturbance in the system. I have noticed that less urine is formed in summer than winter, and that when violent perspiration has robbed the blood of much serous transpiration, then so little urine is sometimes passed, as to have led to a supposition that a dangerous obstruction existed, and a horse has in consequence been injuriously forced with diuretics. It is also to be observed, that, in our present state of veterinary knowledge, we are not able to obtain many pathognomonic hints from the various modifications of urine. It is true that, when purulent, we are aware that ulceration is present in some of the passages; and when ropy, that mucous abrasion exists in the same. When the urine is tinged with blood, we attribute it to lesion of the minute vascular texture of the kidneys; and that this does not more often happen is more to be wondered at than that it does occur, when we recollect that these organs are situated immediately within the sphere of action of the psoæ muscles, whose contractions in a long journey, or in very powerful efforts under a heavy weight, either in riding or drawing, must be continually exposing them to pressure. Our observations on the components of

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from the different parts of the body, and transport it into the lungs, thus a solution of camphor, placed in any of the serous or mucous cavities, may be detected in a few moments after in the breath. A camphorated clyster in five or six minutes taints the breath also with the odour of camphor; and the same, according to this great physiologist, occurs with almost all the odoriferous substances that do not combine with the blood. Flandrin found in the chyle of the lacteals no odour similar to the liquid contents of the intestines, but a very marked one in their venous blood.

[*] The experiments of Majendie shew a different result: he says, 'I have seen dogs excrete urine with their abdomen laid open, and the bladder out of the reach of the abdominal muscles. If we even detach, in the male dog, the bladder, the prostate gland, and a small portion of the membranous urethra, after some moments the bladder contracts, and projects the urine with a distinct jet, till that liquid is entirely expelled.'

æquine urine will likewise prevent our wondering that he is occasionally the subject of urinary calculi; and the same observation will prevent surprise that diabetes is now and then a visitor among horse maladies. Dr. Prout has shewn, that if a portion of the hydrogen in the urea be removed, the remainder is converted into sugar; and how many opportunities the various changes brought about by an artificial treatment of our horses have of abstracting hydrogen from the fluid, we need not here press. Finally, it ought not to escape our observation, that many active substances taken into the stomach, and received into the circulation, exert none of their sensible properties until separated within the kidneys; thus cantharides, either rubbed on the skin or taken into the stomach, fail to inflame the bloodvessels; but, arrived in the kidneys, recover their active qualities, and produce violent effects. Diuretics, generally, appear to act by a specific property of stimulating these organs, though inert to the intermediate route they traverse.

The Male Organs of Generation.

The *genital* parts of the horse are most of them external; on the contrary, in the mare, they are principally internal; but in both they are connected with the urinary organs, by which one part is made to answer two purposes.—The *scrotum, purse*, or *bag*, containing the testicles, is formed from the integuments of the abdomen: outwardly it is smooth, thin, and scantily supplied with hairs; internally, it is lined by cellular substance, and by a fibrous layer, called *dartos**, which forms a distinct capsule for each testicle; and by an application of their capsular sides to each other, a septum is supplied which completely divides the scrotal cavities.

The *testicles*, which occupy the scrotal pouch, are two ovoid glandular bodies†, that, in most animals, are first formed within the abdomen, and in some quadrupeds, and in all birds, always remain there. In the fœtal colt they are lodged within the belly, immediately behind the kidneys, and in some cases are retained there till some time after birth; in others a temporary descent follows birth almost immediately. The coverings of the testicle are, first, a partial one from the cremaster muscle, which, according to Girard, arises by joint fibres from the ileo-abdominalis and lumbo-abdominalis muscles, continued with the spermatic cord till it reach the testicles, when its aponeurotic digitations become merely aponeurotic, and inserts itself into the tunica vaginalis (vide *h, plate* IV)‡. The *tunica albuginea* is the first true testicular coat, and closely invests the body of each, being the portion of the peritoneum that surrounded the testicle in its first situation within the abdomen. It is white, firm, and externally smooth. The *tunica vagi-*

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* The dartos I used to consider as muscular; but as regards the horse, whose scrotum is never observed to corrugate, I am now disposed to doubt; and am more inclined to think it, with Girard, as an elastic suspensory ligamentous expansion, of the nature of the cervical ligament.

† In very large horses, each testicle is considerably larger than a duck-egg, but is, nevertheless, smaller than the testicle of a bull. Girard remarks of them, 'La gauche est communement un peu gros et plus pendant;' which is substantially true: and he might have added, that the large curvature of the left is usually somewhat more posterior than the right; at least so I have remarked it.

‡ The cremaster is an additamentary part rather than a tunic; but it is a very useful one, greatly strengthening the general mass; and how powerfully it acts as a contractor, whoever has grasped a testicle in the operation of castration can bear witness. An equally striking one is the temporary taking up of the testicles within the outer ring, which occurs between the sixth and tenth months. This muscle, like every other, is liable to fatigue: the pendulous state of the testicles in the debile horse, either from inanition or fatigue, shews this. The running horse, by the extremity of his muscular exertions, has the testicles barred up to his belly immediately after a long race; but the stimulus over, the cremaster loses its power, and the testicles appear like those of a stallion debilitated by recent or too frequent coverings. In protracted illness this flabby state of the scrotum and prostration of the testicles must be familiar to every practitioner.

nalis is the second tunic, and is the loose, sheath-like covering seen cut open in *plate* IV; within its cavity a portion of serous fluid is found, the morbid increase of which becomes hydrocele, a disease uncommon in the horse*. Internally, the testicle is formed of a congeries of minute tubes, within which the spermatic secretion is formed; these tubuli produce ductiform bodies, from the union of which arise the vasa efferentia, whose numerous convolutions form the *epididymis* or appendicular part, seen traversing the upper border of each testicle, as shewn at *plate* IV, where also, its final termination in the secretory duct, the *vas deferens* may be observed. Beside the spermatic secreting arteries, the cord receives a branch of supply derived from the iliac; the veins, numerous and tortuous, empty themselves in the cava; and nervous influence is derived from small twigs given by the hypogastric plexus. The absorbents of the testicles are large, and may be readily traced, accompanying the cord.

The *vasa deferentia*, or spermatic excretory ducts, at first take an independent course, in numerous convolutions, as seen in the display of the right testicle in *plate* IV; at length each joins the spermatic cord, and proceeding with it into the pelvis, by means of the abdominal rings (yet to be explained), it takes an upward and backward course, increasing in its volume, and finally gains the lateral and superior surface of the bladder, to terminate near the verumontanum in the urethra, either alongside or within the opening of the seminal vesicle. The *vesiculæ seminales* are situated one on each side of the neck of the bladder, immediately behind and contiguous to the vas deferens: these membranous sacs, which contain a mucous secretion, have large excretory ducts, that terminate also in the urethra by orifices just noticed. The *prostate glands* are described by Girard and Mr. Percivall as one large and two smaller glandular bodies: other comparative anatomists quote, some two, some three, and others four prostatæ, so indeterminate are their appearances†. I believe it will be usually found, that the great prostate of Girard might be more correctly described as two bodies (see *f, f, plate* IV), having an intermediate dorsal portion. The *lesser prostates*, or Cowper's glands (see *g, g*), are two smaller glandular bodies, less elongated, of the size and shape of a chestnut, situated near the last described, lying upon the branches of the ischium. The former are cellular; these are more regularly cavernous, and both furnish a mucus, whose numerous outlets are seen near the verumontanum of the urethra. There is no doubt whatever that the vesicles and prostates are assistants to the seminal fluid, but in what degree or by what manner is not known.

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* Those in the habit of castrating will occasionally meet with adhesions, which, having formed between these two coats, render it necessary to dissect it out. I mention this, that the junior practitioner may be on the alert in case of a testicle not readily sliding out of its sac, and avoid shewing an embarrassment unfavourable to his reputation.

† In two subjects I particularly dissected for graphic illustration of the generative organs there were evidently four distinct prostatic masses encircling the portion between the neck of the bladder and bulb of the urethra; but it is to be remarked, that anomalies are as common here as in man, who is sometimes with and sometimes without Cowper's glands. French anatomists describe also a third accessory vesicle as not unusual in the horse; but in the æquine prostatæ, combinations and modifications are even more common. As regards these, I beg to remark that their situation is not so strictly lateral in most subjects as represented *by the figure*, but have rather more of a dorsal aspect.

The Penis.

The penis, or yard, is a firm body, nearly two feet in length, somewhat prismatic posteriorly, and cylindrical towards its anterior extremity. The *sheath*, which incloses it from view in its ordinary state, is formed of the common integuments, continued loose from the scrotum to the umbilicus, and united in this course by a raphe; forming altogether a very extended envelope, which is reflected and carried inward with the retracted penis. The pendulous outer fold of sheath owes it bulk to a firm ring-like ligamentous substance within, useful in keeping the orifice open and firm: from this the reflected integuments become thinner and more vascular, and are again reflected so as to encircle the glans penis, and form its *prepuce*. Such is the situation of the parts when the penis is retracted; but when erect, it will be found that the ring of the glans forms the termination of the external part of the sheath, and that the integuments are stretched from it in a true continuation over the whole extent of that part which appears without its vulva, being firmly attached to the extremity, or head, but loosely only to the rest of the parts: when the penis again contracts, and enters the sheath, it draws this portion or prepuce with it, within which is seen a moist secretion that keeps these parts from adhering. The body of the yard is composed of two cavernous flatted portions closely connected, and a canal admitted within an inferior groove.

The *urethra* is this canal, which is continued through the body of the penis from the neck of the bladder, from whence, to its quitting the pelvis, it is principally membranous, the spongy bulb being inconsiderable. As it passes round the pubis, from behind forward, over the angle formed by the junction of these bones, it becomes enlarged and muscular also. In taking this course, it is evident that the *angle* made by it must be very acute, and tend to increase our difficulty of entering the bladder*. Arrived at the ischial arch, the canal is bound firmly to the pubic bones, and here it commences it character of penis by receiving the copora cavernosa. The *bulb* of the urethra is a spongy inconsiderable portion compared with the human corpus spongiorum; and may be distinguished by its prominence in the canal, extending from the vicinity of the prostates to some way beyond the curvature. The internal surface of the urethra is highly sensible and vascular, and, besides being pierced by the several semiferous ducts, it presents numerous mucous orifices or *lacunæ:* thus formed, this important tube at length terminates in a fossa in the centre of the glans penis by a projection of its inner membrane.

The *corpora cavernosa* are two cavernous bodies originating separately by the two *crura* from the tuberosities of the ischium: their union together takes place near the symphysis pubis, and leaves an inferior groove for the lodgement of the urethra. They are externally covered by a very strong membrane; internally, they are cavernous, exhibiting a mixture of muscular fibre with a compact cellular substance: their cells are always furnished with blood, but when the penis is erect they then become fully distended; in fact, their cells, as may be readily seen in a dried preparation, are a true continuation of the veins. These cavernous bodies terminate some inches before the extremity of the penis by a tubercle, which is received into a corresponding depression in the glans.

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* In the human subject, although the urethra makes an equally sharp turn around the inferior part of the pubis, yet as in him the penis is unconfined, so a sound, or catheter, can be introduced into the bladder: but in the horse, from the close attachment of the penis to the belly, we can only introduce an instrument as far as the perinæum; and to carry it into the bladder, we must make an external opening in that part on the introduced instrument, and by that opening re-introduce it within the canal, at which part the spongy substance of the bulb is not considerable, nor is it surrounded by any of the more important glandular substances.

The *glans penis* appears a distinct part, and is not formed, as in the human, of an expansion of the spongy portion of the urethra; it is also cylindrical, and extends some inches up the yard. It is connected to the corpora cavernosa by a strong cellular connexion, and by a continuation of the ligamentary integuments of the yard, receiving the rounded end of the cavernous parts into an appropriate depression. Its internal substance is very spongy and cellular, so as to admit of equal expansion with the other parts of this body, and ends in a kind of ring around its verge, which is larger and more prominent above than below. This anterior surface of the glans presents a considerable depression, or fossa, with a central eminence, formed from the termination of the inner membrane of the urethra, which divides the fossa into an anterior and posterior division, within which there is usually a quantity of sebaceous matter; the whole surface of the prepuce being furnished with it from glandular orifices. The *muscles of the penis* are, the erectors, the accelerator, and triangular. The *erectors* arise from the tuberosity of the ischium, embrace the roots of the cavernous body, are inserted into its lateral parts; and it follows that by their contraction they apply the penis to the belly, and consequently are of great use in copulation or *covering:* their power must also be very considerable to counteract the weight of the yard. The *accelerator* is a fleshy expansion extending over the bulb, and over nearly the whole length of the urethra, by which both the urine and semen are ejected from the urethra, and the canal kept closed when it is not passing one or other of these fluids. The *triangular* is a similar expansion, but spreads farther back, assisting the accelerator, and acting on the *prostates* or Cowper's glands, so called, one known as the great prostate, and two others smaller. Both the arteries and veins of the penis are furnished from the pudendals; the veins particularly form a complete net-work over its dorsum. The nerves of the penis and its sheath originate from the lumbar and sacral. We had almost omitted to have mentioned the two small teat-like papillæ, in some sort forming a communicating line of structural connexion between the horse and the mare, which are seen, to use Mr. Percivall's descriptive language, near the borders of reflexion of the sides of the sheath. Internally they assimilate in structure with the dugs of the mare, being, like them, imperforate; thus connecting the general features of both parents.

Female Organs of Generation.

The only female genital parts which deserve to be called external are the labia and their commissures; but it is usual to add also the clitoris and meatus urinarius, which are absorbed within the great fissure; the mammæ, though necessary to the grand end, not being essential to the immediate reproductive process. The *vulva*, or sheath of the pudendal parts, is a long oval opening divided from the anus by a small space or *perinæum:* its two *labia*, closely applied to each other, are united above and below by their *commissures:* the inferior of these is thick and rounded, and is indented by the navicular or *scaphoid* fossa*. The tumid substance of the labia is made up of adipose and cellular membrane, intermixed with a strata of muscular fibres or *sphincter vaginæ*, which, in copulation, embraces the penis, and at other times supports and closes these lips. The vulva does not appear to terminate with the labia, but is continued, by an extension of their substance, for five or six inches; which part of the canal M. Girard designates as the *bulbes vaginæs*, and Mr. Percivall as the *corpora cavernosa vaginæ*.

The *clitoris*.—The inferior commissure, being separated, is found to lodge a body like an imperforate glans†, which, like the male penis, has two cavernous bodies attached to the ischium, internally cellular, and externally strong and elastic; it has also an expansion of muscular fibres, or *erectors*, which perform a similar office with those muscles in the male.—The *meatus urinarius*, or entrance to the urethra, is situated beyond the clitoris, nearly four inches from the entrance of the vulva‡. The female urethra is short, but large, and direct in its course: it is principally membranous, with an internal vascular surface furnished with lacunæ similar to the male.

The *vagina* is a long canal, capable of great extension, about ten or twelve inches long§. Its direction is nearly horizontal, and is situated between the bladder and rectum; by its external orifice uniting with the vulva, and by its internal terminating in the neck of the uterus. It is composed of a spongy cellular substance interwoven with numerous bloodvessels; it has likewise a considerable muscular fabric, and is lined by a fine vascular secreting membrane, which is thrown into numerous folds, whereby its capacity for distention is much increased. The vagina, uterus, and bladder, are only in part covered with peritoneum, and the extent of this covering is easily seen in the dead subject; for it takes in as much of these parts as can be observed within the cavity of the abdomen. The female bladder, therefore, though it might be punctured like that of the male without penetrating the abdominal cavity, yet it must be through the vagina, and therefore is a still less eligible operation in the mare than in the horse.

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* Among horsemen, the commissures are remarked on as indications of having had none, few, or many progeny. After repeated foalings they become loose or open; but particularly the inferior is seen elongated and somewhat everted, so that a good judge will at once detect her productive properties.

† The difference between the situations of the human and æquine clitoris will not escape the observer; in the mare it being found at the under margin of the vaginal canal, but in women at the upper.

‡ Mr. Percivall insists, with great propriety, on the necessity of being well informed regarding the *situation* and *direction* of the entrance to the female urethra; and observes, 'that the conduit into which it (the meatus) leads is about two inches in length, and its course *downwards* and *forwards*.' It may be added to this, that the orifice may be distinguished by its size, which is sufficient to admit a finger; and also by a doubling or fold of the membranes of the canal, which, although it protrudes a little, yet may be rather said to fall over the orifice, and which, in passing a sound or catheter, it would be well to remember must be first elevated for its introduction.

§ Girard. and Mr. Percivall, describe as vagina the whole canal from the labia to the cervix uteri; and hence give it, with justice, under such consideration, a length of eighteen inches; but other French anatomists have treated of it as having its first portion formed of the vulva, being continued inwards for five or six inches; and the difference in structure between the anterior and posterior portions of the canal being such as seems to authorise this distinction. The membranous valvular fold of this part was mistaken by Mr. Hunter, who thence was used to assert, that women, mares, and elephants, alone had a hymen. Dr. Gärtner also has discovered two canals in the vagina and uterus in the cow, sow, and some other mammalia, which terminate near the Fallopian tubes.

The *uterus* has a body and two branching portions, called its *horns*[*]. The body is implanted into the vagina by a narrow portion called its neck, from which it is continued about six or eight inches of the size of a small intestine in diameter, having its fundus extended rather beyond the bladder, and bifurcating into two large cornua, each six or seven inches long, which float within the cavity of the abdomen, one to the right and the other to the left, under the anterior part of the ilium, rather without the pelvis, resting directly upon the large intestines, and behind the convolutions of the small ones. To prevent any prejudicial removal of these parts from their situation, the peritoneum, after it has covered the body of the uterus, is reflected over the horns, and forms the two broad ligamenta lata. Within these are the *Fallopian tubes;* each of which presents a small tubular body, attached by its apex to the extremity of each cornua, while its broad extremity, called the *fimbria*, like the large part of a trumpet with a fringed edge, floats in the cavity of the abdomen, slightly attached by one part to the ovaria. The *ovaria*[†] are two oblong oval bodies of the size of an egg, and are situated at the extremity of the uterine horns, enveloped within a fold of the peritoneum: they are composed of a compact spongy substance, containing a number of little transparent vesiculæ called *ova*, each of which is surrounded by cellular substance and coats, the outer of which is represented as belonging to the ovaria; for when the vesicle escapes, this remains, and produces an indentation, and leaves a green spot, which remaining spot is called *corpus lutea.*—The vessels and nerves of the uterus have been described in the sections on Angiology and Neurology.

The *æquine mammæ.*—The bag of the mare, although apparently uniform, presents two distinct collections of glands, very conveniently placed, in an animal destined for quick motion, between the hind legs: each mamma is made up of an infinity of arterial ramifications, from which the *milk* is secreted. The *teat* or *nipple* (of which there are two) receives the milk by several tubes, which have separate expellent orifices, with valves placed superiorly over each, by which the fluid, in ordinary cases, is prevented from flowing out; but the nipple being elevated, the valve opens and permits its descent: thus the colt is seen to push up the teat with its nose; pigs and puppies with their feet; and a similar action is made use of in milking of cows. The *milk* in different animals has different component parts, and varies in taste; but in each it has those best adapted to the animal it is intended to nourish.—See *Hygrology.*

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[*] In few internal organs is greater diversity of character observable than in the uterus, and it is remarkable that the most simple kind belongs to the human. From man the complexity increases in various degrees, but still not in a ratio with the importance of the animal, or his general complexity of structure. In the dog, hedgehog, and the larger herbivora, the uterus bicornis is found: in a third kind we find a double uterus, where the cornua, instead of opening into a common cavity, enlarge into two distinct uteri: such is the case with hares and rabbits.

[†] It was formerly very common to call these female testicles; and although their structure is more simple, yet their apparent connexion is strengthened by the circumstance, that they are found in the females of all animals where testicles are found in the males, and serve to keep up that structural similarity that is found between the male and female organization.

SECT. XVI.

THE PHYSIOLOGY OF THE REPRODUCTIVE SYSTEM GENERALLY.

NOTHING in the animal economy is a greater subject of admiration than that reproductive process whereby a new being arises from certain acts of the old. In the lower orders of animals, the production of young appears but a simple effort; but in the higher orders, it comprehends a series of acts much more intricate and obscure. In quadrupeds there is a true sexual distinction and division of generating organs; the work of propagation is mutual, and it becomes necessary for the male semen to render the female ova prolific, either by direct contact or by a sympathy which we cannot explain.

Of *œstrum*, or *heat*.—That the great work of propagation might not be left to chance, all animals are irresistibly impelled to it by the sensation of lust, called, in quadrupeds, *heat*. This impulse is happily delayed until the animal organization is nearly complete, otherwise we should have parents imperfectly developed, and progeny without stamina; and, as long as it remains sufficiently entire for the rearing of young, so long they are subject to a periodical return of it[*]. The *appetency of the mare* is vulgarly called *horsing*, and is known by vascular changes in the generative organs, and by some nervous excitement in the system generally: the vulva swells, and is highly reddened; staling is excited more frequently, and is followed by the ejection of a whitish mucous matter from the vagina, in stable language called the *heats*: sometimes it is slightly bloody[†]. The usual period of the heat of the mare is between April and July; it occasionally appears in the former month, but in healthy subjects is seldom protracted until the latter. It is sometimes very trifling in the case of aged, hard-worked, or emaciated mares; and, by some constitutional anomaly, it often continues the whole summer, particularly in barren mares, who will, some of them, admit the horse whenever put to them. Where this exists to such a degree as to weaken the animal or to render her disgusting, the removal of the ovaria might be attempted with hopes of success.

The *male appetency* is constant, but not uniform: low feeding, cold weather, and absence from the effluvia of mares, greatly mitigates it; but during the season of female œstrum it rages with uncontrolled force. The irritability of the stallion at this time is well known, and his impatience of restraint bespeaks the ungovernable nature of his desires: even the sluggish and otherwise insensible ass will swim wide rivers, leap hedges, and go through fire, to prosecute his amours. These effects are, without doubt, produced by the absorption of the semen into the blood, where, in the course of circulation, it produces its peculiar influence on the sensorium, and from thence to the sexual organs. The *generative functions of the horse*, therefore, consist in elaborating a *fecundating fluid*, the *semen*[*]; and also an *apparatus*, by which this fluid can be placed within the female parts destined for the purpose. The *generative functions of the mare* impose on her the necessity of receiving within a *fecund matrix* the male semen, there to be nourished and evolved after the likeness of the parents.

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[*] This periodical return of œstrum appears a settled plan in the economy of nature, that the offspring might be brought forth under the most favourable circumstances to their well being. In the grazing tribes it occurs so that their progeny appear in the spring, when herbage is plenty, the temperature genial, and when time may be allowed for them to gain strength to bear up against the rigours of approaching winter. In the larger orders of herbivorous animals, the production of young is to this end limited to an annual supply, that their numbers might not starve themselves, and the arts of man therefore cannot increase it: but nevertheless the powerful agencies of cultivation and artificial habits have materially altered many of the phenomena attending their reproductive process: and as shelter and nurture are found for them at all times of the year, so the periods of their œstrum or heat return at uncertain intervals, as confinement or highly stimulating food may hasten the sexual excitement: thus colts and calves are seen at Christmas, and lambs long before. In the lesser tribes we have, by finding the means of their support, altogether diverted Nature out of her course, and the domesticated dog will breed three or even four times in two years, while the wild dog and his congenors, in a state of nature, produce generally but once a year. The cultivated hog farrows in a few months from her former littering, while the wild hog brings forth progeny but once in twelve months. In the human subject, sexual desire is providentially constant, that the stimulus to a continuance of the species might not be arbitrarily impeded; but it is never violent, that it might be under the restraints of reason and decency; had it returned at stated periods, as in brutes, it would have been troublesome and irrestrainable. Man, by his intelligence and omnivorous habits, can always supply his progeny, and therefore they are brought forth at all seasons.

[†] If a mare be accidentally destroyed during her œstrum, it will be found that this vascular state of the organs extends to the uterus, its cornua, and to the Fallopian tubes. These signs of *concurrent* aptitude for fecundation throughout the organs have led to a practice of stimulating, by *artificial* means, the outer organs to induce the fecundating aptitude of those within. Infusions of cantharides, &c. have been thrown up the vagina, or have been given by the mouth, in cases where the œstrum has been delayed, or where it has been desirable to produce an early foaling; which, in breeding for the turf, is a desideratum sometimes: and as success has occasionally attended the attempt, it has been too often practised. It is, however, unnatural, seldom succeeds, and has proved very injurious, and sometimes fatal: The best stimulant is liberal feeding, warmth, and moderate exercise only.

Copulation is the immediate act by which the generative functions are mutually accomplished. By a peculiar sympathy present in the male system, the cavernous substance of the penis becomes distended with blood poured in from the pudic arteries, and retained there by a spasmodic constriction of the venous system, aided probably by mechanical pressure against the bones of the pubes. In this state it enters the vagina; the testicles, drawn up by the cremasters, the acceleratores urinæ, and levatores ani, are alike spasmodically and sympathetically convulsed, and an ejaculation of semen follows. The mare is also affected by a venereal orgasm, but of less manifest intensity: and although her frame is agitated, her actions are rather passive than active; and it is, perhaps, to stimulate her into increased energy, that he is seen to seize her by the neck with his teeth, while he powerfully embraces her by the approximation of his fore extremities; in doing which he retains not only a more firm hold, but probably also further stimulates her by means of the semicorneous substances within the arms, called by the French the chestnuts (*châtaigne*), and which, if I am not mistaken, is the principal purpose of these hitherto ill-understood parts[†].

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[*] The semen is a fluid we know to be compounded of the secretions of the testicles and the mucus of the prostates; it also probably receives something from the vesicles, unless it be concluded that the sole use of those organs is to furnish a reservoir for the semen: to which belief there is the difficulty of accounting for its retrograde admission; as, on the other hand, it has been observed that, without some such storehouse, the extensive supply demanded for copulations so often and so quickly repeated could not be obtained. Of animalculæ found in the semen, which are equally present in the horse as that of man, and where, consequently, equiniculi have as much right to be looked for as homunculi, I will only observe, that every fluid of the body may be found to be a nidus for parasitic life, if glasses of sufficient power be used. The semen of the horse is semi-opaque, of a very slightly yellow tinge, and peculiar odour: it may also be added, that whatever admixture it may receive from the accessory organs is not essential to its vivifying qualities generally, seeing that in several quadrupeds they are altogether wanting, particularly the vesiculæ seminales: the prostatæ are much less seldom absent.

[†] I have been but lately only led into a conviction that the functional purpose of this organ (heretofore deemed altogether useless) is manifestly that of a *prehensile* nature, and probably something of a *stimulating* medium also. That it is prehensile no one will doubt, if they observe it when uncut (long and horny as it then is), indented into the parietes of the thorax of a mare, by the amorous pressure of a stallion in the copulative act. The analogies between these horny processes and other organs notoriously intended for this purpose, are such as to render it a matter of wonder that their true use has hitherto remained unnoticed. I may cite, as striking parallels, the pedal tubercle which appears annually on what is called the thumb of the frog, during the breeding season, and disappears when it is over: by these, it is notorious this salacious animal continues irremoveably applied to the body of his mate for many hours. Another analogical instance exists in the spur on the hinder legs of the male ornithorynchus; by which the natives observe he attaches himself and retains his hold of the female during his sexual intercourse. It remained for British anatomists to demonstrate the further claim of this organ to unite, in a particular degree, the stimulating with the prehensile character. Types of these organs of adhesion are to be met with in other mammalia, whose purpose is well known to be of this nature: nor are they wanting in fishes and insects, but in such only as perform the fecundating process by a penis intrans. Armed with these analogies, if any candid person will take the trouble to observe the *leap* of a stallion, and to note, at this time, the close application of these protuberances to the post-scapulary hollows of the mare, and particularly in those few cases where they may be found of their natural growth; if he will afterwards mark the impressions left by them, he will admit, not only that they are well calculated to afford an additional hold on an animal whose fine hair, directed backwards, must offer a very slippery medium for contact, without some extra adherent points, but that the extent of this pressure must act, in some measure, as a *stimulus* also. On the subject of extra stimuli offered in the person of the male to heighten the female energies during the copulative process, there are abundant proofs throughout nature that such exist, either in organs expressly formed for the purpose, or in the temporary use of organs adapted to other functions. It is a remarkable fact, that both pleasure and pain are employed as sexual stimuli in some animals; the proportion of the latter might even be supposed to preponderate over the former: in some, as in the common cat, whose cries, from the scaly spines of the male glans and the bony portion of the urethra, are proofs of her sufferings: this bone in the penis of the dog is even more considerable, and its intrusion within the female urethra is rendered even more irksome by other structural peculiarities intended to prolong the copulative act. The stallion seizes the mare by the neck, and often bites her with fury, to rouse her into extra action; and if the ring-like verge of his penis be not cartilaginous, like that of some animals, yet, when fully distended, it must act very forcibly on the sensible vascular surface of the female vagina. It is, therefore, not forcing analogy too far to consider that the semicorneous chestnuts of the horse, when indented into the sensible sides of the mare, act as a stimulating as well as a prehensile

The copulative act is one of much more animal expenditure to the male than to the female, which is proved by the consequences of a too frequent repetition of it in him[*]. In the mare, although her œstrum is sufficiently evident, yet her conduct in copulation is attended with less expenditure of system, and is also marked with less salacity; and it is this which gives rise to those varied modes in use among male animals, already hinted at, to rouse the females into increased action[†].

Conception and *pregnancy.*—Conception follows a fruitful covering, and the majority of mares require but one copulation for the purpose; in which case the *heats*, as they are termed, cease, and the animal will afterwards refuse the horse. As the symptomatic appearances of *heat* recur at intervals of eight or nine days, it is therefore usual at that period to make the experiment. In a physiological point of view, *impregnation* is brought about by means of the action of the semen on the ovum or germ; but whether the effect is produced by *actual contact* or by *sympathetic influence*, the most arduous investigations have not yet fully informed us; although the balance is, by direct experiment, very much in favour of the actual transmission of the impregnating fluid through the uterus and oviducts to the ovarium; which is rendered more probable by the circumstance that the ova of the multiparous animals never reach the uterus, but are retained in the cornua[§].

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spur on the occasion. In this view of the matter, novel as it is, I am prepared to meet with much difference of opinion, and expect to find it urged, that, as these organs exist as well in the mare as the horse, and as well in the hinder as in the fore extremities, they cannot be intended for such functional purposes. To the validity of such objections, I would call the attention of the candid opponent to the existence of nipples also in the horse, where their only intention can be to aid in that harmony and uniformity observed throughout Nature's works; particularly in making the organization of one sex so strikingly a type of the other. I would also equally urge, that Nature's obvious intent to render the anterior and posterior extremities of all true quadrupeds as similar as the nature of their progression will allow, sufficiently accounts for the presence of the chestnuts on the hinder legs. The spur of the domestic cock, situated as it is on the metatarsal bone, is supposed by some to have, besides its powers as an organ of defence, an especial sympathetic influence over the genital organs. See Blumenbach on this subject.

[*] This consideration is apt to give way to cupidity among the great breeders of horses, who allow their stallions to cover until they are emaciated and lose their condition; by which their procreative powers are injured, or their progeny do not inherit the true qualities of the sire. It may be regarded as a rule, that as soon as the crest of the stallion ceases to maintain its firmness and elevation, and his coat falls off irregularly, he is too often employed in this way for his powers. It is much better to attend to these premonitory symptoms than to fix any daily number of mares; for, like ourselves, one horse excels in one quality, and another in a different one. Brabham covered fifty-three mares in the same season that he won several plates: such united exertions in training, running, and leaping, would have ruined many other horses. Previously to the covering season, stallions should be regularly prepared by exercise, mild physic, and nutritive food: but by no means remove a stallion at once from meagre food to plenitude and excitement, or inflammatory diseases, and eruptive ones, may follow. Farcy and glanders have succeeded these neglects in caution, nor are ruptured diaphragms and blood-vessels without precedents from such causes.

[†] To prevent the irritation arising from frustrated desires of valuable stallions, when brood mares are suspected of being shy in receiving the horse, it is common to try them with a stallion of inferior worth, to rouse their dormant passions. It is also prudent on another account, the skittishness of some mares making it dangerous to bring a horse of great value within their reach: in such cases, it is better either to hopple the mare, or otherwise to place a bar to remain between her and the horse. The *leap* completed, the mare usually ejects the superfluous seminal secretion, mixed with some of her own, which has occasioned attempts of various kinds to restrain it, all of which I believe to be totally useless: for the work of impregnation is, without doubt, a momentary one, and occasioned by a small portion only of semen, which finds its way to the ovaria; the remainder is altogether useless, and the attempts to confine it within the womb, where alone it could be useful, by tying down the tail, or wrapping of whisps of hay or straw up to the vagina, are alike useless. Some breeders flog their mares, and others ride them for a considerable distance, both before and after the act, for the same purpose; which custom was probably gained from the Arabs, who, Girard informs us, "sont dans l'habitude de fatiguer à la course la cavale qui doigt être saillie afin que, restant en repos après le coit, elle puisse être plus efficacement fécondée."

[‡] As a proof that the semen is not arrested within the vagina, but is carried into the uterus and ovary, Haller informs us he saw semen in the uterus of a sheep: Verheyneus, in a cow; and Huysch asserts that in the bodies of two women, who were accidentally killed immediately after copulation, he found semen not only in the uterus, but in the Fallopian tubes. Mr. Hunter saw it likewise in the uterus of a bitch who was killed immediately after copulation by puncturing the spinal marrow. See also some interesting experiments in reference to this subject, by Dr. Haighton, *Phil. Trans.* 1797, p. 159; and by Mr. Cruickshanks, *ib.* p. 197. Other eminent physiologists, however, are of opinion that impregnation is not the effect of immediate contact, but of a subtle exhalation from it, termed *aura seminalis.* M. Mondat, of Turin, asserts, that in eighteen out of twenty trials, in which he introduced the semen of a dog, by means of a tube, into the vagina of bitches in heat, impregnation followed, and these experiments he prosecuted in the presence of two other physiologists. What is more to our present purpose, he asserts that the same results followed on two mares. These, however, cannot be termed decisive experiments, seeing it was equally possible that the uterus might receive the substance of the semen by absorption; indeed, it has been the opinion of some, that impregnation is always the consequence of venous absorption of semen from the uterus, which thus acts on the

In a prolific copulation one of the turgid ovarial vesicles bursts its outer coat, which, as already noticed, it leaves as the *corpus lutea* is received within one of the Fallopian tubes, and conveyed by it into the uterus*, to which it is sometime

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ovaria through the medium of the circulation; and, as observed by Majendie, if this could be proved, we might impregnate females by injecting semen into the veins; it would, at least, be very convenient among horses!!

* If a vesicle under the influence of the semen should escape the fimbriated extremity of the tube, and, falling into the cavity of the abdomen, the ovum should be nourished there, it is called an extra-uterine fœtus, and it is evident that the abdominal cavity must be opened to deliver it: but such instances in quadrupeds are extremely rare; in the human they are more frequently met with. There have been instances likewise of an impregnated ovum remaining in the ovaria and tubes, and yet coming to maturity. If two vesicles be impregnated, twins are the consequence; as the forcing of one impregnated vesicle within another will probably account for monstrosities of double bodies, and of our meeting with hair, bones, teeth, &c., within the various organs of the male as well as the female body: these anomalies, however, admit of other solutions, as we shall presently see. The imprinting the sexual stamp on the ovum or egg-state of the progeny,—to whose influence is it to be attributed, the male or female? It is a subject of very great importance to the agriculturist and sportsman; some have supposed it principally dependent on the male, and others on the female. Some physiologists (among whom may be reckoned Sir Everard Home) have been of opinion that the ovum or germ, previous to impregnation, is of no sex, but is so formed as to be equally fitted to become a male or female; and that it is the process of impregnation which marks the sex, and forms either male or female generative organs. Sir E. Home, in the Phil. Trans. vol. lxxxix, p. 175, informs us, that until the fourth month the sex cannot be said to be confirmed; but that the parts previous to that are so blended, that either the one or the other may be formed therefrom, as a tendency towards the paternal or maternal type may preponderate. In this way it would not be difficult to account for the disposition which some stallions, some bulls, and some dogs, have to beget a greater number of males than females, and *vice versâ*. The same is observed in the human. In the Phil. Trans. 1787, p. 344, mention is made of a gentleman who was the youngest of forty sons, all produced in succession from three different wives, by one father, in Ireland. In the church of King's Langley, Herts, are the effigies of seven successive daughters born to a man by his first wife, and of seven sons, the produce of his second wife, in succession. Mr. Knight, a most intelligent naturalist and attentive observer, is favourable to female aptitude in determining the sex. He says, 'In several species of domesticated animals (I believe in all) particular females are found to produce a majority of offspring of the same sex; and I have proved repeatedly, that, by dividing a herd of thirty cows into three equal parts, I could calculate on a large majority of females from one part, of males from another, and upon nearly an equal number of males and females from the remainder. I frequently endeavoured to change the habits by changing the male, but without success.' *Phil. Trans.* 1809, p. 397.—Some experiments made by E de Buzareingues (corresponding member of the Royal Academy of Sciences) in France, had for their object to determine the capability of arbitrarily producing a larger number of either sex. His subjects were sheep, and his results went to prove, that, if the male be very young, there will be produced more females than males, and *vice versâ*: thus, in order to produce male sheep, a ram of four or five years old should be used as the parent. It is also supposed to be under this view, of a readiness in the early state of the ovum to receive any impression, that other of the extraordinary phenomena of gestation may be explained; for whenever the impregnation falls short in stamping its full character on the ovum, not only the secondary parts, as the labia, preputium, clitoris, penis, and mammæ, which appear so contrived as to be equally adapted to the organs of the male or female, and, therefore, by some curious anomaly, may readily be blended, but also that the testicles may be substituted for the ovaria; or that neither an ovarium or testicle, but an organ bearing a resemblance to both, may be formed, and may either remain in the natural situation of the ovaria, or pass into the situation proper for the testicles, or the labia pudendi of the female. *See an extraordinary case of this related by Mr. Percivall in his Lectures*, Part 3, p. 112. In this way also hermaphrodites may be formed, of which an instance in the horse is given in Mr. Sewell's Reports; and this, it is supposed, will account for the free-marten among cattle, as well as why twins are usually of the same sex, and that, when otherwise, the female has usually less of the female character, and frequently does not propagate. That the great work of reproduction is divided between the sexes, we know, but the exact limits of their proportional influence we shall probably ever remain unacquainted with. Some have supposed that the male parent is principally concerned in giving the characteristic external form, while the internal organization is derived from the mother. With others the male influence is supposed to predominate throughout, and they regard the mother as a mere hotbed, wherein the seed is placed with its full stamp, to be simply reared; which opinion, as regards horses, has probably been formed from the too common want of attention in the selection of the female as a parent: any mare rendered unfit for other service is yet retained by many of our farmers to produce colts, without reference to form or qualities; and as it is these who are the principal breeders of common hacks, and common draught horses, the evil is great. Fortunately it is not so with the practical breeder of the better kinds, among whom the ratio of future expectation is even most built on the male; and it is a very general opinion among breeders for the '*turf*,' that it is very seldom indeed that a *bad* mare produces a *good* runner, although *got* by a *good* stallion; but, on the contrary, it is not at all uncommon for a very *indifferent* horse to produce a *good* runner from a *bad* mare. It must, however, be remembered that this principally relates to the single property of speed, and therefore must not lead us too far: on the contrary, an attentive examination of the subject, and a careful collation of facts, will shew that the general characteristic form of the animal is arbitrarily settled by Nature, but the individualities of character in the separate organs is usually divided between the parents, in nearly equal proportions. This is exemplified in the breed which arises from the intermixture of the blood with the cart-horse, where the extreme difference in form and character is nicely blended, yet the peculiarities of each remain distinguishable. The judicious breeder, therefore, will do well to select both sire and dam with equal care, opposing the defects of one parent, both mental and bodily, by superior excellence in such immediate points of the other. Occasional anomalies, however, will occur; and the external characters of some breeds are actually observed to be principally derived from the male, and in others from the female; but these do not tend to alter the general similitude observed towards both parents. In the multiparous animals the influence of one parent evidently preponderates in a part of the progeny, and of the other to another part of it. Thus it happens that, when a pointer and a setter breed together, it is not unusual to find part of the whelps almost perfect pointers, and the remainder as nearly true setters. The hybrid mule

after found to be universally adherent, by the following means. A layer of effused lymph is thrown out over the entire surface of the uterus and its connexions, forming the whole into one closed cavity: this effusion becoming or-

divides the æquine and asinine characters; at the same time it must be allowed, that the hinny, or produce of the stallion and ass, is more allied to the horse than the mule. Nature will not be wholly *driven* out of her track, but she may be *diverted* from it; and it is one of the highest attributes of the philosopher to seize on the advantages derived from the one, and avoid the evils resulting from fruitless attempts to force the other. Domestication and cultivation go hand in hand; for what we domesticate it is our interest to protect and cultivate. By this close intercourse, we learn how to correct the qualities of the present breeds, and how to regulate both the organization as well as qualities of the future races: by this particular breeds are preserved in their original integrity, or are improved, or new varieties are introduced. In fact, there appear, at first view, hardly any limits to our powers over the size, form, and qualities of our animals, when subjected to the physical and moral agencies resulting from judicious domestication. In some cases, the very base of the machine, which is the most intractable of parts, submits to our caprice; and thus we breed wry-legged terriers, to shoot rabbits to; and wry-legged Scotch sheep, to prevent their straying. The Herefordshire ox can be bred to a white face, or a half white face, and the length of the horns of others can be ensured to an inch. The colour of the game cock is arbitrarily imposed by the handler and feeder: and the experienced pigeon-fancier can breed to a feather.

The *breeding system.*—It is evident that these arts would have failed, had not man taken on himself to regulate the sexual intercourse; by which the selection of models was in his power, when, by a judicious balancing of merits and defects, he became enabled to produce harmony and an approach to perfection in the forms reared. It has resulted from these selections that our racers have been brought to excel in speed the fleetest of the Arabian breed; and that stallions have been sold for one thousand guineas, for the mere purpose of exporting to India. In the ruminants, cultivation has been equally successful, and judicious breeders have sold bulls for three hundred guineas and rams for half as much. It is the same with our dogs, among which greyhounds have been let out to ward bitches at five and I believe even ten guineas each female. In this consideration, it should not be lost sight of that the mental qualities, as well as the personal, are proved to admit of cultivation and of being handed down in the breed: many qualities may be considered as dependent on the organization, such are hardihood, particular excellence in one pace, &c. and which, *à priori*, it would be expected might be perpetuated; and we are not surprised at a son of Eclipse or Match'em having speed in his gallop, or the produce of a Norfolk trotter excelling in that pace; but it has not been taken into the account that temper, courage, docility, and patience under restraint, are equally handed down in hereditary descent, as the peculiarities of form. We have said Nature may be diverted but not wholly driven out of her course: the former have been seized on to enable us to beget and to propagate excellencies; but with this advantage, we are constrained to own that we have propagated defects also, which circumstance it requires the breeder to bear in mind; for it is now well known to the observant, that very many of the diseases incident to the horse are hereditary; and that, if the actual ailment be not immediately born with them, the predisposition is; and it only requires an exciting cause to call some of them into action. Blindness from ophthalmia is thus transmitted: founder, bony exostoses in the shape of splents and spavins, and broken wind, are popular names for morbid affections that are frequently observed to be heir-looms to some breeds.

Purity of blood.—A very long-continued and rigorous confinement of the sexual intercourse, or, as it may be familiarly expressed, of breeding from particular races or families only, begets what is popularly known by the term purity of blood. A *blood-horse* is one derived from the Eastern races, where the accounts we meet with of the primogenitor tracings exceed Cadwallader's genealogical tree; and experience has proved to our own breeders, that this perpetuation of particular races or families, in every kind of domestic animals, tends to keep up the desired qualities in each. But in none is it watched over with such jealous care as in the horse, and particularly in that variety termed the race-horse. The pedigree of many of our present racers can be satisfactorily traced back for one hundred and fifty years, and many so recorded have never received one impure admixture; to which close confinement of the reproductive system is attributed the continuance of their astonishing powers; and although philosophy may shrink from the doctrine of specific organization and interminable qualities, as so confined, yet we must bend to the weight of experience and the force of a long series of facts, which have proved that such organization and such qualities can only be continued by confining the descent in the same immediate line.

The *in-and-in* system of breeding, popularly so called, is that which is conducted by choosing parents from the nearest affinities, and which, from an opinion that nature has placed both physical and moral impediments in the way of it, is with many deemed an ineligible practice. The result of my observations, as detailed in my 'Canine Pathology,' has been to convince me that most of the evils resulting from the *in-and-in* system are imaginary. Our earliest races must necessarily have sprung from consanguineous intercourse, and must, for many generations, have been so kept up; it is, therefore, most unphilosophic to suppose that Nature would have made her first essays in animal character generally on a principle tending to the deterioration of her noblest works. This view applies equally to man and beast; but if we descend in the scale, and examine the brute creation only, we shall find reason to consider it as offering to our choice some benefits, and probably some objections. If we look for precedents, we are assured that the Arab horses of the best blood are bred *in-and-in*: and as these horses have the greatest possible attention paid to them, the deteriorating effect of such a practice could not have escaped observation, had it existed. Mr. Bakewell reared his valuable stock wholly from family alliances, and in fact his improvements were founded on confining the intercourse to relationship. Mr. Meynell bred most of his celebrated fox-hounds from the nearest affinities; and our *turf* records afford numerous instances of the best breeds being kept up by what has been called, by a very forced construction, incestuous intercourse. Shakespeare, who some assert to be the real sire of Eclipse and Childers, were both so bred. Highflyer, Mark Anthony, and Regulus, owned no blood but that of the Godolphin Arabian; and the descent was thus continued through many generations. Old Fox, Priestess, the little but fleet horse Gimcrack, Damper, and many others, were also bred from the nearest affinities. A scientific breeder says, 'that pursuing the same *strain* for three or four races, such strain may possibly deteriorate (but this is merely opinion): however, the mode of breeding I am partial to is, to cross out once and then back again.' Many other successful rearers of racing stock also, though averse to breeding in succession from near relationship by blood, are favourable to it in a remote degree, which is particularly the case with some rearers of game fowls, who seek the ganized, receives the name of *chorion*, and is separable into two laminæ: that which remains attached to the surface of the womb is called by Dr. William Hunter *tunica decidua uteri;* the other, and which becomes reflected over the ovum, was thence named by the same great anatomist *tunica decidua reflexa*. When the ovum exhibits traces of the *germ*, and which, gradually developing the lineaments of the *embryo* or fœtal colt, renders the whole a subject capable of distinct examination, it will then be found surrounded, as already pointed out, by the deciduous and reflected portions of the chorion; the latter forming its proper outer involucrum, within which is an inner and finer expansion, called the *amnios*. In the latter periods of pregnancy the tunica reflexa becomes covered with or succeeded by the *allantois**.—The *placenta*. From the attachments of these outer involucra originates a direct communication between the parent and offspring, called the *placenta*†. Into this the uterine arterial branches terminate; and

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intercourse of a third remove, which they call a '*nick*.' I could quote innumerable other authorities in favour of *in-and-in* breeding, but candour obliges me to own, that there exists a large number of able antagonists to it also: one objection to it certainly exists, which is, that as there are few breeds which do not own some hereditary defects, some disease, or predisposition to it, or some detracting quality; such are likely to be perpetuated through the whole race, but which a judicious crossing would have removed.

Breeding back.—While on this subject, it becomes me to glance at a very curious phenomena in the reproductive system, popularly known by the term of *breeding back;* by which it would appear as though the ova or germs of the future race were *originally* formed after one common mould, and which, if it were not for accidental circumstances and foreign commixtures, would always bear the same stamp. It is thus observed that the progeny of the horse, and of most domestic animals, do occasionally bear a more striking resemblance to the grandam, or grandfather, than to their immediate parents; and it must be evident that this is more likely to happen when one common character has been preserved during successive generations, or, in turf language, where the blood has been preserved pure. A practical hint naturally presents itself on the extreme importance, therefore, of admitting no accidental admixture of blood, where it is peculiarly requisite that it should flow in true lineal descent; knowing that its debasing consequences are carried unseen through one or two generations, and unexpectedly appear in a third or fourth. It remains to add, that our conviction that the organization, the qualities, and even the diseases of the mare are imprinted on her offspring, is, from anatomical considerations, little to be wondered at; but by what mysterious laws can her imagination even have influence over the young within her? and although such phenomena are more frequent in the closely domesticated animals, as dogs, &c. it occasionally occurs in the mare also. Lord Morton produced a breed between a male quagga and a chestnut mare, and which mare was afterwards bred from by a black Arabian horse; the progeny, however, exhibited in colour and mane a striking resemblance to the quagga. D. Giles, Esq. had a sow of the black and white kind, which became pregnant by a boar of the wild breed, of a deep chestnut colour: the pigs produced by this intercourse were duly mixed, the colour of the boar being in some very predominant. The sow was afterwards bred from by two of Mr. Western's boars, and in both instances chestnut marks were prevalent in the young pigs, which in other instances had never presented any appearance of the kind.—*Phil. Trans.* 1821. See many other instances detailed in the *Canine Pathology*, third edition, p. 94. It is evident that these facts deserve the utmost attention among the breeders of horses and other domestic animals, inasmuch as very slight causes may frustrate the hopes entertained of any particular race.

* Some further notice of these investments may thus be taken. Of the *chorion*, the uterine portion, or tunica decidua, is somewhat spongy, adhering to the womb by vascular filaments, and is strictly *maternal;* for though continuous with the reflexa, or *fœtal portion*, its vessels do not at all inosculate with it, as is proved by injecting the umbilical vessels, in which the true chorion and amnios only become filled with the wax, as well also, that, if the vessels of the mother be injected, the wax flows into the tunica decidua only. By insisting on which it is intended to prove, that by this intervention *the vital principle of the fœtus, or change of its blood from a venous to an arterial character, is absorbed from the mother in the self same manner as in the adult state it is gained from the bronchial ramifications*. In the ruminants, the uterine portion of the chorion presents depressions, into which are received prominent portions of the fœtal part, called cotyledons or placentulæ. The *allantois* of the mare, although not very evident until advanced pregnancy, is a complete membranous expansion, found between the chorion and amnios: in the ruminants it is less considerable, while in swine, rabbits, &c. it dwindles into little more than a tube; and throughout the mammalia it presents numerous modifications. It appears to derive its origin from the dilatation of a canal that arises from the bladder of the fœtus, called the *urachus*, which being continued to the umbilicus or navel, is reflected over the cord, and over the inner surface of the chorion, and outer of the amnios, and is destined, as is supposed, to receive the urine of the fœtus within its cavity, the fluid contained presenting all the characters of urine. It is within this the substances called *hippomanes* are found, resembling detached masses of coagulable lymph, from ten to fourteen in number. These questionable substances are not confined to the horse, but exist in the sow also: the old term, therefore, of horse venom, is as inapplicable as the ideas formed by the ancients relative to their adherence to the forehead of the foal, and that, as they were attached more or less firmly, they were omens of good or evil. The term hippomanes, as used by Aristotle, Hist. An. 8, 24, refers to the mucus on the skin of a foal at birth, which the mother removes by licking: or, as in 6, 18, to the '*humor ex equarum equientium naturalibus distillans*.' The *amnios* is a very fine but firm membrane, immediately involving the fœtus, and secreting a fluid, liquor amnii, in which the fœtus swims till birth, and by which it is guarded from pressure.

† In the human impregnated uterus the placenta originates from any point on which the ovum may first attach itself to the surface of the cavity; but in most quadrupeds it is widely different. The ovum of the mare, by uniting with all the surface of the membrana decidua, forms it into one surface of placentation, which in her is extended even into the cornea, thus offering to our notice another equine speciality tending to the functional purposes of the young animal; and, as far as we know, mares and asses are the only animals found with so extensive an attachment of placenta.

from hence the nutritive vascular rami take their origin, by which the foal receives nutriment from the mother, through the agency of two umbilical arteries and a vein which occupy a membranous rope of nearly three feet in length and an inch in diameter, called the *umbilical cord*, and which, in addition to these vessels, gives passage also to the *urachus*, the whole being enveloped in a gelatinous matter. Thus constituted, this rope, which originates from the uterine surface and terminates in the umbilicus of the foal, forms the communicating medium between the mother and offspring; and it is thus that her uterine organs are made subservient to the development of the fœtus, as her mammary are afterwards employed in its future accretion and perfection. In the early periods of gestation the investing fœtal membranes are by far the larger portion of the uterine contents; towards the middle period the fœtus and involucra are nearly equal, but in the latter months the weight of the young animal greatly preponderates. It remains to remark on the increase of the uterus by actual accretion of parts, by which, from being completely hidden within the pelvis, its fundus advances beyond its cornua nearly to the epigastrium, when at length, becoming painfully distended, it essays to rid itself of its burthen by contractions on its contents[*].

Parturition or *foaling*.—The premonitory symptoms of foaling are a sudden enlargement of the udder; sometimes milk may be expressed from the teats; the vulva protrudes; and when the act has commenced, the tail is protruded: a restless shifting and change of place, with some heaving of the flanks and some acceleration of the pulse, are also usually present. The painful contractions of the uterus now call in the aid of the abdominal muscles; deep inspirations are made, to enable the diaphragm to assist in forcing the uterine contents backwards, by which the mouth of the womb dilates, and thus ruptures the attachment of the chorion. As the propelling efforts become more violent, the hind legs are set wide apart, to form fixed points for muscular action: the membranes now protrude in the form of a bladder, which bursting, often brings with it the young one also, particularly in large roomy mares, who have had several foalings. At other times the act is more protracted, and the head, with the fore legs, are more gradually protruded into the vagina; when usually a few more efforts usher the whole animal into the world, whose descent to the ground commonly ruptures the umbilical cord, and is accompanied by the remaining waters and a gush of blood. The *secundines* formed from the placenta and membranes, popularly called the *afterbirth*, occasionally accompany the foal; and when this is not the case, the whole comes away very soon after.

The *gestatory term* is considered by breeders to range between eleven and twelve months, these periods forming the extreme limits; but, according to the observations of M. Tessier, in 582 mares, which copulated but once, the shortest period was 287 days, and the longest 419; making the extraordinary difference of 132 days, and of 89 days beyond the usual term of 11 months. His memoir states that, of two female asses, one brought forth at the end of 12 months and 20 days, and the other at 13 months and 1 day. The cow occupies about 9 months in gestation; the sheep, 5 months: swine usually farrow between the 120th and 140th day; but they also exhibit great variations in this particular, influenced apparently by size and breed. Bitches pup near the 63d day. Horse-breeders have a notion that a mare carries her first foal longer than her future ones.

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[*] The *symptoms of pregnancy* in the early months are not very decisive; there is no menstrual discharge to be suppressed, as in the human female; although the total cessation of œstrum is in many instances some guide to our opinion. Neither does the mare, in usual cases, exhibit any sympathetic effect between her stomach and uterus; and therefore for three or four months the matter remains uncertain, particularly in pastured mares. Some distention takes place after this period; and it is usual to expect to discover the motions of the fœtus by placing the hand flat on the fore part of the belly of the mare when in the act of drinking, particularly if she be thirsty and warm; at which time the change of temperature and the distention are apt to excite sensible motions in the young within. Pregnant mares should be well fed, and, if worked at all, let it be only during the first six months of gestation; for a contrary treatment will not only endanger the present, but all her future progeny; as the habitude of abortion once excited is very liable to recurrence, even without violence. If a mare appears very large for the time of her gestation, even more than usual caution is required, as twin foals render her particularly liable to miscarriage. Mares in foal should never be pastured with vicious or even playful horses: some geldings even are salacious, and will leap on a pregnant mare; and others may kick or worry her. These cautions are still more requisite as her pregnancy advances; and she should, if tender or valuable, be nightly housed, that the young foal may not be dropped in an unfavourable situation, or stagger into a ditch or pond.

Lactation.—As soon as the foal comes into the world, it is interesting to observe how readily, and without functional disturbance, it submits to the loss of its umbilical connexion with the mother; and how soon it opens another source of support, by seeking for the parent milk, which it is sometimes, with a weakly foal, prudent to assist it in doing, by setting it on its legs, and supporting it to the teats. The first milk, instead of being prejudicial, as supposed by some, who therefore draw it away, is, equally with them as with us, beneficial; as by its purgative qualities it brings away the mucous contents of the fœtal alimentary canal, thus clearing it out for acting on a more nutritive and elementary food. Occasionally the mammæ refuse their office, and do not yield any or not sufficient milk; or a mother may die: it is consolatory to know that colts can be, and have been, successfully reared by hand. Cade and Milksop, both excellent racers, were thus reared[*]; and either cows' milk, or that of asses, may be employed for the purpose. Should that of cows be found to scour, it should be boiled: or it may be medicated by having sugar and starch added to it[†]. The udder of the mare does not become completely distended with milk until the third or fourth day, in which state it continues to yield its secretion until the nippers of the young one enable it to browse the more tender grass, when it gradually forsakes the bag, whose secretory stores dry up, and the bag resumes nearly its former dimensions; it is said nearly, because once having given suck, a certain distention may always be observed in both bag and teats[‡]. The connexion having ceased, she again feels œstrum, and again goes through the reproductive process[§].

The Fœtal Colt, and the Physiology of his Organization.

Unlike the human young and those of many other animals, the fœtal colt is not born indigent; but, on the contrary, its aptitudes and its organs for locomotion are already developed, and it is capable of performing many of the common phenomena of life with dexterity and ease; to enable it to do which, its organization exhibits some specialities worthy of notice[‖].

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[*] But, notwithstanding these instances, I cannot recommend the practice; but in cases of necessity, and in such where no extreme expectations are formed of the offspring: for there are not wanting facts to warrant an opinion, that the milk of a foster mother can have an effect on the mental and constitutional qualities of the adopted, by some sympathetic connexion kept up between the organs which secrete the milk and those which receive it. If this be true, it however enables us to open a new source of improvement, and interchange of properties: but it is probable that it would operate most in those who, being born indigent, receive the personal attentions and mental solicitudes of maternity in the greatest degree, as dogs, cats, &c.

[†] It must strike the naturalist how much greater is the ratio of nutriment in a given bulk of mare's milk than that of the cow; as well as how admirably this agrees with the habits of the parent to be thus unconfined from the monstrous udder of the ruminants, and yet to be able to yield at once so nutritious yet so condensed a beverage.

[‡] It is a subject of curiosity, that the presence of the young of both the mare and the female ass is necessary to keep up the lactiferous secretion; and we cannot gain their milk after their young are removed, as we do from cows: with the maternal sympathy the secretion ceases.

[§] I have, on the subject of the teeth, been at some pains to prove that we limit the age of the horse too narrowly; and the breeding of the mare is another instance of the same, although in the very face of well known facts. It is common to consider the reproductive system of the mare as confined to fifteen or sixteen years; when many instances occur of mares rearing healthy and useful progeny at twenty-five years old. After the old Tartar mare, as she is usually called, had passed her twentieth season, O'Kelly cleared £30,000 by her produce. Mr. Pratt's Squirt mare produced seventeen foals in succession, most of which proved valuable racers.

[‖] We are too apt to take a confined view of the animal economy, and to consider it in reference only to that artificial state into which we have brought the domesticated creatures, rather than that in which nature originally placed them. Thus, our consideration of the horse philosophically directed, will teach us to regard him as living uncontrolled, and surrounded by predaceous animals, greedy for his blood and flesh, which, it is observed, is more keenly relished by them than any other animal mass, from most of which his only hope of escape is by flight. He should also be regarded as by nature destined to rove extensively in search of food; for in a state of nature where these animals congregate, that is, where they associate in herds, the scanty provisions raised on one spot, without the assistance of agriculture, would not long suffice the wants of a numerous assembly of wild horses; and our physiological examination of his organs should be directed towards a capability for this kind of life; and we should not draw our inferences from the nurture of the stable, or the education of the riding-house. Regarding him therefore aright, we shall find the structure of this noble animal admirably adapted to his economy: the young colt, as soon as foaled, appears capable of making considerable exertions, and is possessed of great speed; by which he can accompany his mother and the associated herd, either in flying from their enemies, or in search of food; and if we examine him attentively, we shall find his exterior form, as well as his internal economy, admirably adapted to this: his body is very slender, and

Fœtal circulation.—It has been shewn that the placenta owns a maternal and a fœtal portion, in which distinct circulations are carried on. Into the latter the umbilical arteries, first anastomosing very freely with each other, then terminate wholly in returning veins. In the maternal portion, on the contrary, the arteries are furnished from the uterus, and terminate in an *exhalent orifice* and a returning vein. This exhalent orifice is a very important agent, for it deposits a fluid of a chylous quality, which, becoming absorbed into the vessels of the fœtus, is *the source of its nutrition.* It is evident, therefore, that the blood thus received, after having circulated through the fœtal body, and given out its nutritive principles, must return impure and venous, through the umbilical arteries; which in this case, as is seen, carry venous blood, as the umbilical veins bear blood of the arterial character; having become oxygenated in the cells of the maternal portion of the placenta, and having there also received its chyliferous principles. Thus, therefore, the placenta forms the true fœtal lungs; in fact, it forms also the true fœtal stomach; and it may be said to be the organ that possesses the specific power of the aerating and chyliferous organs combined, while the fœtal organs themselves only enjoy the life fitted to their evolution, but not that adapted to their specific action[*]. The umbilical vein, it was just now stated, carries arterial blood, which it gains from the exhalent orifices of the uterine portion of the placenta, where a new speciality presents itself: for having gained the umbilicus, it leaves the umbilical arteries, plunges into the sinus of the vena portæ, and there deposits its whole contents, and is by that means circulated with the blood of the abdominal viscera. In the human, on the contrary, and in all other animals that have been examined, except the ass, there is a considerable branch of the umbilical vein, which, by communicating with one of the hepatic venal trunks, appears designed to prevent the whole of the blood from taking this circuitous route: this forms the *canalis venosus*[†]. From the liver the æquine blood is passed into the vena cava, and from thence to the right auricle; but it does not from this wholly enter the right ventricle, as in the adult horse; but a part of it escapes through an opening in the septum of the heart, between the right and left auricles, and is poured into the left auricle, from whence it is prevented from returning by the Eustachian valve: this opening, called the *foramen ovale*, closes up as soon as respiration takes place. The remaining blood is suffered to proceed, as in the adult, into the right ventricle, and from thence into the pulmonary artery, where another structural impediment to the pulmonic passage of more blood than is merely necessary for support presents itself by a lateral trunk of communication, called *ductus arteriosus*, found between the pulmonary artery and the aorta.

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consequently very light, and his legs are remarkably long, by which he can reach his food, the milk; and by which he is also enabled to exert very considerable speed without making any greater exertions than his juvenile state will admit of. On the contrary, in animals who seek the safety of their young by hiding them in holes and caverns, where it is necessary for their preservation that they should remain quiet, Nature has wisely given them a correspondent form: their bodies are fat and unwieldy, that thus they may have a constant disposition to rest and sleep; and which is further brought about by their being blind. Their legs also are short, so that every impediment is placed as a bar to their roving till they possess something like the parent strength and the parent intelligence: but the internal economy of the foal is such, that he has no need of much sleep to quicken digestion; for, in him, the process of solution is not carried on in the stomach wholly, but in the intestines likewise: therefore he can be always alert and on the look-out to avoid surprise. In the stately herds of horned cattle likewise, though the calf can make considerable exertions at birth, yet there is not that studied attention to its speed, and the safety of the offspring consists in the means of defence given to the parent by its formidable horns; and, consequently, to them Nature has given a greater degree of ferocity when they have young, that they may make use of these means; but, in the mare, who has them not, she is stimulated to trust more to flight than resistance. Therefore, that the evolution of the parts of the colt at birth might be such as to admit of these necessary exertions, we find a considerable peculiarity in the gestation of his mother; for, by the very extensive attachment of the placenta to the whole surface of the uterus and its cornua, the blood must be much more oxygenated; there must be likewise a much greater quantity of chylous nutriment, and hence the organs of necessity are more completely evolved at birth, and fitted to greater exertions. By this means it is that his pelvis is completely ossified when foaled, and many of the epiphyses of the bones likewise, which, in the human infant, remain cartilaginous for many months afterwards; and it is for this purpose, it is more than probable, that the very extensive attachment we have pointed out is permitted in the uterus of the mare.

[*] As the blood of the fœtus draws its oxygen from the placenta, so it must be evident, according to the modern doctrines, that the vital heat of the fœtus is derived from this source: but as the oxygenation of the fœtal blood is probably not so complete as that of the adult, so the heat evolved is less, which is compensated by being surrounded by a high and uniform temperature.

[†] It is somewhat remarkable, that the early French veterinary anatomists, as Vitet, Lafosse, and even Bourgelat, one and all describe a canalis venosus in the fœtal horse.

The small portion of pulmonic blood is returned by the usual manner into the left auricle, where, uniting with that which had escaped from the right through the foramen, both entering the left ventricle, pass into the aorta, and, being joined with that also received by the *ductus arteriosus*, the whole becomes distributed over the body in the usual manner[*]. The umbilical arteries of the fœtal colt are very considerable vessels, derived from what are called by Girard the bulbous trunks, which themselves spring from the internal iliacs, immediately after their origin: in their passage, each towards its appropriate side of the bladder, they approximate and join the urachus, proceeding together as a part of the umbilical cord.

Descent of the testicles.—It is necessary, before I describe this interesting process in the fœtal economy, that I say something of the construction of the track by which these organs reach the scrotum. The *abdominal ring* (or as it might be called rings, for there may be said to be an outer and an inner) is not only a prominent feature in this, but an important one also in some morbid phenomena, particularly in hernia. The fleshy walls of the abdomen are formed of four pairs of large muscles, whose central line of union forms the *linea alba*, which is seen perforated by the umbilicus or navel. The obliquus abdominis externus (*costo abdominal*, G.) is the most external of these, and arises by ten or twelve fleshy portions, from so many of the posterior ribs, as well as from the spine of the ileum. From these origins its fibres are directed *obliquely* downwards and backwards, to be inserted into the whole extent of the linea alba; and from it two important aponeurotic expansions leave the ileum, one of which, of little strength, stretches unattached to the pubis, and is called *Poupart's ligament**. The other, which is stronger and more decidedly tendinous, proceeds rather in advance of this, but unattached also, to be finally blended with the dense fascia within the thigh. These *unattached* portions consequently offer an abdominal outlet, and give passage to the spermatic cord in horses and the round ligaments in mares: it is thus that the true *abdominal ring* is formed. That part called the inner ring, or inner portion of this outlet, is gained from the intersections of the obliquus abdominis internus (*ilio-abdominal*, G.) and of the transversalis abdominis (*lombo-abdominal*, G.), in such a manner as to appear formed immediately within the expansion of fascia named by Sir A. Cooper transversalis†.

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[*] The specialities above hinted at naturally excite some inquiry as to their determinate purpose: the intention of the extensive placentation in the uterus of the mare has been already observed on; and as regards the want of a canalis venosus, so common in man and other animals, it has been already shewn that in the fœtus, or unborn colt, the glands and other organs have only the function of *secretion* to perform, but are not employed on any *specific action*: thus the blood furnished to them is sufficient for their structural support only: for were the liver to secrete bile, and the kidneys urine, and so with the other glands, the destruction of the fœtus must be inevitable; we, therefore, presume that Nature has introduced a contrivance purposely to render the blood less pure, that the *specific action* of the organs might be prevented. We may further remark that, as the maternal placenta only vivifies the fœtal blood in a secondary manner, that is, after it must have given out some of its oxygen, so it is evident the blood of the umbilical veins, when first received, is but in a comparative state of purity; that as it passes towards the heart in most mammalia, except the horse, it mixes part of its blood with that circulating through the liver, by which it must be rendered still more impure: and here we can but admire the peculiar wisdom displayed; for as the liver is the only gland that secretes from venous blood, that its specific action might not be employed at this time, it is so arranged that, in the horse, it shall receive purer blood than any other organ. Neither is it to be wondered at that there should be some curious speciality in this instance, seeing that, as the placenta in the mare is connected with the whole surface of the uterus, there must consequently be a very great absorption of oxygen from this extensive attachment. Nor does this at all tend to destroy our former argument, that this speciality was purposely designed to favour the taking up an extra quantity of *nutritious principles* by the fœtal foal; for it has been already stated, that these are of two kinds, the aerating and chyliferous; the former of which only is here *less necessary*; the latter is purposely intended for the evolution of the parts, and is consequently in *full requisition*. As the lungs also are kept simply in a state of capacity, the ductus arteriosus must be considered as an intended stop to the passage of the blood through them, they having as yet no aerating office: the blood, therefore, passes at once from the right to the left side of the heart.

Foramen ovale.—It remains to remark, that the existence of this communication (which in two subjects that I examined appeared sufficiently distinct) has been taught throughout the continental schools, is also depicted in the works of their greatest veterinary anatomists, and which, if I greatly mistake not, was long, if it be not now also, demonstrated at our own Veterinary College, is altogether denied any existence by Mr. Vines, a gentleman to whom the veterinary world has many obligations, and whose dissections and experiments entitle his observations to every attention. I, therefore, give room to the substance of his account of the fœtal circulation; assuring him, that the error of its existence, if it be one, was not *necessarily* '*derived from human anatomy*,' seeing it is described by such numerous veterinary authorities: nor was it even *probably* so derived, as may be judged from the general tenour of the page in which it appears, and the very subject where it is embodied, which are all replete with parallels drawn between the human and brute organs. My limits will not allow of my transcribing more proofs of the former, numerous as they are; I shall, therefore, content myself with the following, from the 3d edition of Girard's *Anatomie Vétérinaire*, published in the year 1831, with the corrections of its celebrated author. 'La colonne sanguine de la veine-cave posterieur arrive en majeure partie, dans l'oreillette gauche, *à la faveur de l'ouverture ovale du septum auriculaire*; de ce reservoir, elle parvient dans le ventricule gauche, et de la dans le tronc primitive de l'aorte.' From this it may be judged, that, if I have erred in my description, it has, at least, been in good company. I will now extract not as much as I wish, but as much as my limits will allow, from Mr. Vines' researches into the fœtal circulation, which appeared in the *Lancet*, and which is so replete with interest and somewhat new views of the fœtal dependencies, as to be worthy the full attention of the veterinarian. 'Hitherto,' says Mr. V., 'the *foramen ovale*, in the fœtal heart of the horse and ass, like that of the human subject, has been described as being formed by an opening through the partition between the right and left auricles of the heart; and that a valve is so constructed and situated, that it allows the blood to pass from the right to the left auricle, but not from the left to the right. Now, in the fœtal heart of the horse, ass, and likewise that of the calf, we certainly find something of this kind of appearance; but it is only when examined previous to its being injected; and if the auricles and ventricles be injected through the medium of the posterior cava (the vena cava ascendens in the human subject) and the connexion between the auricles, then completely divided, no foramen ovale, or opening of any kind, is to be seen; and if the posterior cava be examined close to the auricles, it will be found to open into the left as well as into the right auricle, thereby shewing that the blood, which is brought from the placenta and posterior parts of the body, enters partly into the left and partly into the right auricle of the heart; and consequently the blood of the placenta, which enters the left auricle, unites with the venous blood that is returned from the lungs by the pulmonary veins, and, by thus uniting, becomes of the arterial character: it then enters the left ventricle and aorta of the heart.

The *fœtal situation of the testicles* is immediately behind the kidneys‡, from whence they eventually make their way into the scrotum; but by what means the transit was made was merely conjectural, until Mr. Hunter's discoveries cleared up the difficulty. He found that, when situated within the cavity of the abdomen, they were enveloped by a prolongation of the peritoneum, in the same manner with the other viscera; and were each of them likewise attached to a ligamentous substance of a pyramidal shape, whose base, or broad part, adhered to the testicle, while its other portion was continued through the abdominal rings, to be attached to the bottom of the scrotum. This ligament, which he termed *gubernaculum testis*, attains its full growth before birth; after which period, it begins to contract and shorten itself; but, as it cannot draw the scrotum within the rings, nor free itself from the testicle, it therefore draws the testis itself from its situation under the psoæ muscles, surrounded by its peritoneal covering, which forms its tunica albuginea. (See *i*, *plate* 4.) This progress is carried on gradually; and when the testicles by this contraction have been drawn to the abdominal ring, it is evident they must there meet with some obstruction; for the peritoneum surrounding the whole abdominal cavity, as we have described, only permits the passage of this ligament by a minute opening; consequently, in yielding to the pressure, it must either open farther, or the peritoneum itself must be forced down: it appears that it does the latter; and that the testicles, before invested by the peritoneal covering they had in the abdomen, from their tunica albuginea, now force along with them the fold or portion opposed to the ring; in doing so, it is, however, not as a close investment, but as a simple bag-like protrusion forming a vaginal coat to each (see *h in the same plate*); and is finally carried into the scrotum with the testicles by the complete contraction of the gubernaculum testis, which now being no longer wanted, becomes wholly absorbed. It is to be remarked, that by this means an open communication is formed with the scrotal cavity, and which always remains so; the horizontal situation of the trunk of the horse preventing any common protrusion of the abdominal contents through the ring[*].

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* In the human this unattached tendinous edge leaves a more complete opening than in the horse, and thus with the crural vessels it sometimes permits, with us, some other of the abdominal contents also, which protrusion is then called crural hernia.

† Mr. Percivall observes, 'the cavity of the abdomen is closed directly behind the abdominal ring by the internus obliquus and transversalis: under the crescentic borders of which the spermatic cord is taking its course along the *inguinal canal*, and entering the cavity by an opening at the upper part of it, called the *internal* abdominal ring. This aperture, let it be remarked, is not placed opposite to the external ring, but at the space of three inches from it outwardly, and somewhat anteriorly to it; no intestine therefore can protrude directly through the external ring (at least I have never heard of any instance of it); but inguinal hernia in the horse are all oblique, i. e., they pass out of the abdomen at the internal ring, and proceed with the spermatic cord down the inguinal canal, through the external ring, into the scrotum.'

‡ It has been stated that this early placing of the testicles within the abdomen is for the purpose of delaying their secretory purpose; but which must be erroneous, for many animals are true *testicondi*, of which the elephant is a quadrupedal instance, and birds are universally so.

At what time do the testicles first appear in the colt?—As far as my own experience goes, there are great anomalies in the scrotal lodgement of the testicles. I perfectly agree with Mr. Percivall, that they are seldom, if ever, found at the *bottom of the scrotum* until eleven or twelve months have expired; but it must be remarked that high-breeding, and particularly high-feeding, will hasten the descent five or six weeks, in the same manner that it produces other marks of early development. But it is, I believe, equally certain that they do make a partial appearance *in the upper portions of the scrotal bag* within a few days after foaling, and in some cases the animal is even foaled with them already there[†]. We may reconcile the varying accounts of this descent by a circumstance frequently overlooked, which is, that having before or soon after birth protruded themselves through the rings, as though they intended merely to make their appearance and establish their claim to scrotal tenure, they in a longer or shorter period, by the accretion and strengthening of the cremaster muscles, are again drawn up, sometimes only to the edge of the ring, but more often to lodge themselves between the inner and outer rings[‡], where they remain three or four months.

The effect which the presence of the testicles has on the masculine character is, evidently, in due order, a portion of our present physiological inquiry: those alterations which take place by their removal, and the methods pursued for the purpose, will appear with our surgical detail. The permanent descent of the testicles has a great effect on the exterior form; it has a correspondent one also on the character: it is, however, principally in reference to the latter that we castrate; and as we incline to regulate the form between the masculine or the feminine character, so we castrate early or late. (See *Castration.*)

Puberty in both sexes is not delayed until the full maturity and expansion of the system, but in both horses and mares it takes place, if they have been well fed and housed, as early as the second year, and both have been known to procreate at that period; but in both the practice is irrational as regards the welfare of the animals: neither does it appear that the mare, like the human female, has a more early puberty than the horse, which could not be expected in an animal whose perfection is altogether so rapid. After that period, the change of the temporaneous for the permanent set of teeth occurs; and all those characters commence in the male which are to distinguish him from the female. His form expands into rotundity and gracefulness; his action becomes lofty, his crest elevated and thick; his hair, from being crisp and woolly, is seen sleek and smooth; while that of the mane and tail grows singularly long and flowing; and the feet, before round and flat, now rise in height and strength of horn, and assume the form of a truncated cone. The voice also becomes singularly sonorous; and if he remain uncut, he emits a pungent odour, and an excess of cutaneous secretion.

The *adult period* in both sexes may be considered as the fifth year, when the height of the animal is complete; and it is between the fourth and fifth year that the *colt* and *filly* are translated into *horse* and *mare* in the breeders' vocabulary.

Temperament is not confined to man, but is extended to all our domestic animals, and to none more than the horse. It consists in a vital causation, whose effects we recognise, but of whose spring and action we are totally ignorant. We

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[*] In man it is otherwise; for after the testes have passed the abdominal rings, a complete union takes place between the vaginal coat and its cord, and thus effectually closes up any abdominal communication, and of course prevents any descent of interstitial fluid, and intestinal protrusion; but which without such provision would be unavoidable, as we know by what occurs when from malformation this opening remains unclosed; when it usually follows that some of the abdominal contents present themselves within the scrotum, and form *hernia congenita;* as a similar effect resulting afterwards from violence is called *scrotal hernia.*

[†] Girard, notwithstanding, says, 'Les testicules sont logés dans l'abdomen, autour de l'anneau supubien, qui'ls ne franchissent que six à sept mois après la naissance; à cette époque, ils descenderit peu à peu, dilatent les bourses et prennent insensiblement la fermeté qui leur est propre.'

[‡] I have said many anomalies attend this transit: sometimes they never appear in the scrotum; and such horses, though '*riggish*,' seldom procreate. Occasionally one remains within the abdominal cavity; and sometimes one or both, after their removal from the scrotum, are never able again to free themselves from the tendinous fold of the outer ring, but remain there through life.

Fig. 1.

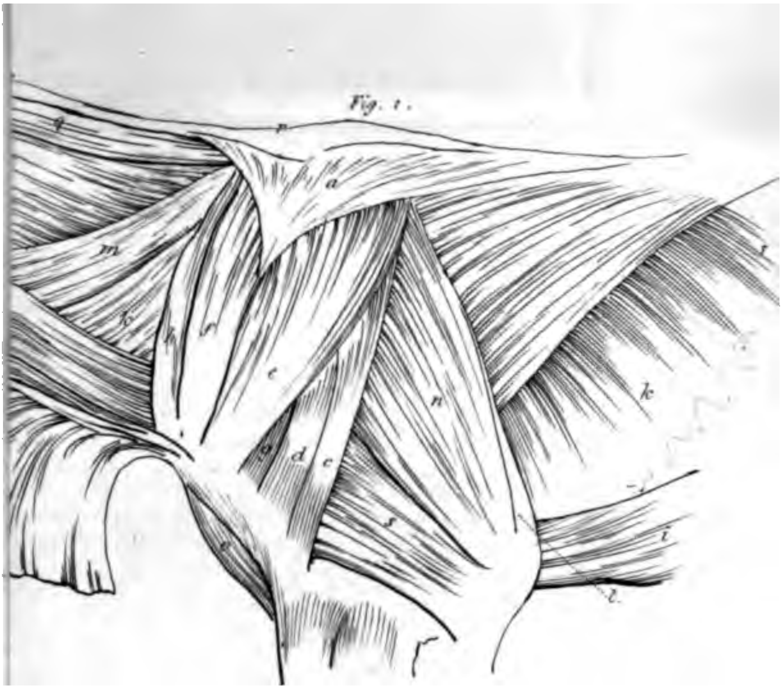
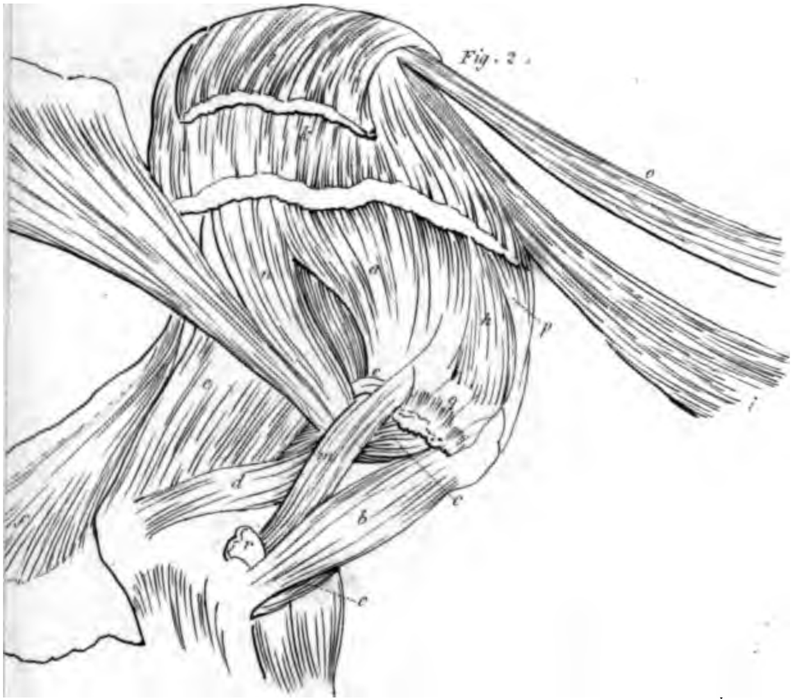


Fig. 2.



D.P.1 G. Kirtland sculp.

possess two horses, probably by the same parents, which exhibit, to all appearance, an exact similitude in organization; but one shall nevertheless prove infinitely more hardy and durable that the other: the *immediate exertions*, in point of muscular force, shall even be the same, but their duration very different: one will travel sixty miles per day with ease, the other will be fatigued by a journey of thirty. One shall be sluggish and dull, the other fiery and irascible, and shall possess organs ever ready to run into a disordered state; and although these two animals may have been reared and domesticated exactly alike, yet their several degrees of capability of bearing exposure, and privations, and resistance to disease, shall be in the opposite extremes. One coughs on every slight occasion; the other never coughs, but perhaps his heels swell on every exposure. Senility overtakes one at fifteen, the other frolics and gambols a Nestor of thirty. Such is *temperament:* but are we to look for its cause or essence in matter or spirit; or, in other words, in organization or susceptibilities?

SECT. XVII.

THE STRUCTURAL AND PHYSIOLOGICAL DISPLAY OF THE EXTREMITIES.

Of the Anterior Extremity.

MUSCLES OF THE SHOULDER.

Trapezius[*] arises posteriorly from several of the spinous processes of the dorsal vertebræ, and blends with the panniculus carnosus, and latissimus dorsi; anteriorly it arises from the ligamentum colli, or cervical ligament, and then runs down in an angular form to be inserted tendinous into the prominent part of the spine of the scapula (*pl.* 6, *fig.* 1, *a*). This muscle is very useful in drawing the scapula upwards and backwards; and, therefore, must be a powerful assistant in progression.

Rhomboideus major vel *brevis.*—This muscle arises, and continues fleshy, from the 3d, 4th, 5th, and 6th spinous processes of the dorsal vertebræ, and is inserted into the internal surface of the cartilage, at the base of the scapula, through its whole extent (*l*, *fig.* 2, *pl.* 6).—*Dorso-subscapularis*, Gir. It draws the shoulder upwards, and attaches it to the chest.

Rhomboideus minor vel *longus* arises under the cervical ligament, to which it is attached nearly its whole length, and is inserted into the anterior edge of the cartilage at the base of the scapula, rather internally: it is very intimately blended with the former.—*Cervico-subscapularis*, Gir. (*q*, *fig.* 1, and *o*, *fig.* 2, *pl.* 6.) It has been called levator scapuli, as, when the neck is fixed, it must tend to elevate and draw the superior part of the scapulary base forward.—*Pectoralis minor* (*sterno-scapulaire*, Gir.), is a long fleshy muscle immediately in front of the scapula, arising from the lateral part of the sternum, under the origin of the pectoralis magnus, to be inserted into the anterior superior part of the scapula (*h*, *fig.* 1, *p*, *fig.* 2, *pl.* 6), by which it acts as a scapulary depressor.

Serratus magnus.—This immense plane of muscular fibre extends over much of the surface of the ribs anteriorly, occupying the whole region of the scapula, to almost the whole inner surface of which it is attached. It forms almost a segmental origin by firm digitated clasps from all the true ribs which intermix with the intercostals, probably for a specific purpose, and is stretched forward into the neck, much of the bulk of the lower part of which is formed by it, and where its great volume purposely intended it to make a fixed point in its action on the *motions* of the shoulder: this cervical origin extends upwards from the transverse processes of the four or five last cervical vertebræ in a voluminous mass also.

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[*] This description, however, forms, according to Girard, only the posterior portion of this muscle, under the name of *dorso-acromialis*, but it best agrees with the operation of dissection and anatomical display.

The united portions then direct the course of their fibres, intermixed with tendinous and aponeurotic also, to be inserted into the whole of the upper and internal scapular surface. The ostensible use of the serratus is that of forming a *fleshy joint* to the fore extremity, it being known that no *bony* connexion subsists between it and the trunk[*].

MUSCLES OF THE HUMERUS, OR ARM.

Antea spinatus fossæ occupies the whole antea spinatus fossa of the scapula; as it proceeds it becomes thicker, and towards its insertion it bifurcates into two portions (admitting the tendon of the flexor cubiti between them), whose tendons are inserted into the two anterior tuberosities of the humerus (*f*, *fig*. 1, *pl*. 6): it powerfully extends the arm, and carries it forward. (*Super-acromio-trochitereus*, Gir.)—*Postea spinatus fossæ major* fills up nearly the whole of the posterior fossa: arising thin, but becoming thicker, it is inserted first and principally into the lateral external and superior head of the humerus, by which it can draw the arm-bone outward and upward: it next sends off a fleshy slip from the humeral ridge into the capsular ligament, to prevent it from being pinched in action (*e*, *fig*. 1, *pl*. 6). (*Sub-acromio-trochitereus*, Gir. *Teres minor*, Per.)—*Postea spinatus minor* is a small muscle immediately under and behind the former, arising from the posterior part of the scapula, near where the spine ends, and is inserted into the upper small tuberosity of the humerus. In its action it assists the former (*g*, *fig*. 1, *pl*. 6).

Latissimus dorsi is a large thin muscle arising by aponeurosis, from all the dorsal muscles almost to the ilium, and from the spinous processes of the dorsal and lumbar vertebræ: becoming muscular, it is continued over the ribs, intimately connected with the panniculus carnosus, as well as with the trapezius. It then contracts, and being continued downwards under the scapula, it is inserted into the internal superior tuberosity of the humerus, either connected with or giving a tendinous expansion to unite with the fascia of the muscles of the radius. It draws the humerus obliquely backwards, and assists the trapezius in elevating the scapula (*g*, *fig*. 2, *pl*. 6.)—(*Dorso-humeralis*, Gir.)

Levator humeri is an extensively spread muscle, of equally complicated origin, insertion, and action: it appears common to the head, neck, and arm; and is, I believe, found only in quadrupeds. It may be described as arising from the tubercle of the occipital bone, from the mastoid process of the temporal, from the transverse processes of the first cervical vertebræ, and the spinous of the next three; it then becomes attached to the cervical ligament, as seen at *r*, *r*, *fig*. 1, *pl*. 6, connects itself very intimately with the fascia of the scapular region, and inserts its immediate tendinous portion into a ridge on the body of the humerus, from whence an aponeurotic expansion connects it strongly with the fore-arm also (*p*, *fig*. 1, *pl*. 6.)[†]—(*Mastoido-humeral*, Gir.)

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[*] Of the importance of this muscle little need be insisted on here, it being evidently the grand organ for sustaining the body between two pillars, in such a manner as to be liberated from bony connexion; by which suspension the machine is freed from concussion, enjoys vast liberty of locomotion, and yet is insured from dislocation by the most violent efforts, shoulder-slip existing only in the imagination of the sapient farrier of the old school, and many grooms of the modern. (See *Exterior Conformation*, and also *Mechanism of the Skeleton.*) But the *serratus* has other offices to perform; it is an important aid in progression, and greatly assists inspiration, and that when it is most wanted, which is, when the proper respiratory muscles are suffering under continuous inflammation from their connexion with an inflamed pleura; at such time they call in this moving power to act on the chest instead, which it can effectually do when the body is at rest, by changing the point of action of the muscular fibres from the centre to the circumference. To aid this operation the fore legs are set wide apart, that the fixed points, removed more distant from each other, may act more advantageously in elevating the ribs. Thus the pneumonic horse stands night and day, to avail himself of the aid of the serrati, and usually he is found with his fore legs apart: thus also the 'blown' horse, ridden to a stand-still, drops his head, throws wide his fore legs, and expands his exhausted lungs by the aid of these muscles. It should have been stated in the body of the account, that, by a partial change of the centre of action, the scapulæ can be moved upward, downward, forward, and backward by these muscles. Girard describes them as three distinct pairs—*costo-subscapulares*, *dorso-costales*, and *lumbo-costales*.

[†] Hardly any two authors agree in their characters of this muscle. Stubbs calls it *latissimus colli*. La Fosse and Bourgelat connect it with the cutaneous muscle, or rather consider the origin from the cervical ligament, seen to hang down in *fig*. 1, *pl*. 6, as a distinct part. In whatever way it is viewed, it is an important agent in the motions both of the head and fore extremity, varying its action according as the head or the arm become the fixed points: and thence it is under these views that it received its name of *common muscle* by Bourgelat, &c., and its divisions by Girard.

Subscapularis.—It fills up all the subscapulary hollow not occupied by the serratus and rhomboid muscles, and the site of the antea spinatus (*h*, *fig.* 2, *pl.* 6). It is inserted into the inner head of the os humeri, to depress the scapula; slightly adducting and rotating the humerus, as well also strengthening the articulation, and preventing the capsular ligament from being pinched (*a*, *fig* 2, *pl.* 6). —*Adductor humeri* is a muscle arising from the posterior and superior edge of the scapula, attached to the former, but sufficiently distinct to merit a particular name, and is inserted internally into the humerus some way below its head (*n*, *fig.* 2, *pl.* 6). It depresses the shoulder, rotates the humerus, and draws it backwards. (*Subscapula-humeralis*, Gir., *Teres major*, Per.)—*Flexor brachialis anticus* arises from the lower part of the scapula near the articulation, and is inserted into the humerus at its upper and outer part, so as to flex and rotate it in action.—*Pectoralis magnus* arises from the posterior half of the sternum, and from the cartilages of the six last true ribs; is connected with the panniculus carnosus, and the aponeurosis of the obliquus; and is inserted into the head of the humerus internally, and slightly into the outer and anterior part of the apex of the scapula. It draws the humerus downwards and backwards. It appears as cut off in the plate, but its insertion is marked by the letter *g*, *pl.* 6.—(*Sterno-trochinus*, Gir.)

Pectoralis transversus is divided into two portions, which arise from the anterior part of the sternum, and are continued over the humerus; one, to be inserted into the lower and inner part of that bone, and the other, into the fascia of the arm: both must powerfully adduct the arm*. It is removed in *fig.* 2, *pl.* 6, but its insertion is likewise marked (*vid. r*). *Coraco-humeralis*, Gir. and Per.—*Coraco-brachialis* arises from the slight process in the human called the coracoid process of the scapula, and is inserted into the humerus, towards the lower head anteriorly (*n*, *fig.* 2, *pl.* 6). It draws the arm-bone upwards and inwards, and must prove an adductor.—*Abductor longus humeri* arises from the superior part of the posterior costa of the scapula: passing along the hinder edge of the next muscle, it is inserted into the external tuberosity, at the upper part of the humerus (*c*, *fig.* 1, *pl.* 6). It rolls that bone outwards, draws it from the chest, and elevates it.—*Abductor brevis humeri.* This muscle arises from the posterior edge of the scapula below the preceding, and is inserted between that and the subscapularis muscle: it assists the former in its abduction of the arm.

MUSCLES OF THE FORE-ARM.

Flexor radialis anticus arises tendinous from the process of the scapula, corresponding with the human coracoid, and runs between the divided portions of the antea spinatus muscle: as it passes over the articulation of the scapula with the arm, it widens and hardens into a cartilaginous substance representing a patella, and which becomes of the same use to this joint that the true patella is of to the stifle; it is also furnished with synovia and a capsular ligament: after this, the tendon is continued between the two anterior eminences of the humerus, from whence it becomes fleshy, having a central line of division, and a strong tendinous or fascial covering, and is finally inserted into the anterior and superior part of the head of the radius, towards the inner side, with the brachialis obliquus (*b*, *fig.* 2, *pl.* 6). This forms the principal flexor of the fore-arm, carrying it forwards and upwards†. *Coraco-cubitalis*, Gir., *Flexor-brachii*, Per.

Brachialis obliquus arises from around the humerus immediately below its head; passes obliquely over the body of the bone, through the extensor intermedii, or rather through an interval left by its attachment, and is inserted into the superior part of the radius rather internally with the preceding. It is a flexor muscle, and can produce a small degree of lateral motion (*o*, *o*, *fig.* 2, *pl.* 6).

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* This principally forms what is known as the bosom of the horse, and was in a former edition named sterno brachialis. Girard considers it as two distinct muscles, which he names *sterno-aponeuroticus* and *sterno-humeralis*.

† It is but barely possible that this pulley-like tendon might become dislocated, in which case the horse might be truly said to have a '*shoulder-slip*.' Injuries to this part are, however, not uncommon from blows, which, producing inflammation, give rise to what is likely to be called '*shoulder-strain*,' the scape-goat of former ignorance of the seat of lameness from the withers to the toe even.

Scapulo-olecranius longus arises by a thin tendinous expansion from the posterior costa of the scapula behind the next muscle: in its course it presents two portions, one of which inserts itself into the point of the olecranon (*b*, *fig.* 1, *pl.* 6); and the other by an aponeurotic union with the fascia of the inner surface of the arm; by which relations, while the former is a direct extensor, the latter also adds to this a preventive operation, in tightening the fascia, and obviating the danger of its being pinched (*f*, *fig.* 2, and *e*, *fig.* 1, *pl.* 6). *Scapula-olecranis grandis* forms a very considerable portion of the fleshy mass upon and behind the humerus, occupying the angular interval between that and the scapula. It derives its origin from the posterior scapular edge, and inserts itself into the summit of the olecranon, in connexion with the former (*n*, *fig.* 1, *pl.* 6). It forms the grand agent in the extension of the fore-arm. *Humero-olecranius externus* is also a thick fleshy mass found between the humerus and the inferior edge of the last muscle: it originates from the cervix and humeral ridge of that bone, and is inserted into the olecranon with the former, whose action it assists.

Humero-olecranius internus is a muscular mass, more internally placed on the humerus opposite the last, which inserts itself into the inner side of the olecranon (*d*, *fig.* 2, *pl.* 6). It assists the former, and is an antagonist to the obliquus. *Humero-olecranius parvus* occupies a situation immediately under the insertions of the two last muscles, between the condyles of the humerus, from whence it directs its short plan of fibres to insert itself with the former, and also into the capsular ligament of the articulation, by which means, in its contractions, it tenses that ligament, and frees it from the dangers of pressure[*].

MUSCLES OF THE CANNON.

Extensor metacarpi magnus, arising fleshy from the tuberosity and external head of the humerus, and from the body of the bone for half its length, its fibres are directed in a semi-pemated manner into a tendon, which, at the inferior part of the radius, passes through a groove under the tendon of the next muscle, to be inserted into the anterior and superior part or the head of the cannon or large metacarpal bone (*a*, *fig.* 1, *pl.* 7). This muscle straightens the knee and extends the cannon. *Epitrochlo-premetacarpeus*, Gir.

Extensor metacarpi obliquus is a thin flat muscle which arises from the lateral part of the radius externally; its fibres pass over the bone anteriorly, and contract into a tendon which proceeds over that of the former muscle, like that playing within a groove, and at length inserts itself into the inner head of the cannon, and into the head of the small internal metacarpal bone (*c*, *fig.* 1, *pl.* 6). This muscle assists in the extension of the metacarpus; but its principal use is exerted upon the ligaments of the knee, which it keeps firm, and from being pinched. *Cubito-metacarpeus obliquus*, Gir.

Flexor metacarpi externus.—The flexor muscles of the extremities of the horse, it may be remarked, are more complex than the extensors. The long tendinous muscle in question arises from the posterior part of the external condyle of the humerus, and from some fibres from the capsular ligament also: arrived at the outer part of the knee, it gives off a tendinous slip to be inserted into the trapezium; the remainder is continued onwards to be inserted into the external small metacarpal bone, and into the ligaments surrounding these parts. This muscle can act very strongly as a flexor by its advantageous attachment to the pisiform bone, being thereby removed far from the centre of motion; and by its connexions (*s*, *fig.* 1, *pl.* 7), as well as by the tightness with which it is bound down to its insertions, it possesses a very compound action, but generally favourable

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[*] Of the five preceding muscles it may be remarked that, together, they form almost a continuous extending muscular mass to the fore arm, which, in the French school, is divided as above. Mr. Percivall describes them, together, as a triceps, having a large, a middle, and a small head. Bourgelat recognized them as the long, the great, the short, the middle, and the small extensors. The first of them as named, in the former editions of this work, *fascialis cubiti*, and which forms a part of the caput magnum of Mr. P., as the second of them forms his other portion of the large head: it also constituted one head of my former biceps extensor cubiti. The third constitutes the other head of my biceps; the fourth makes the brachialis internus; while the fifth, which was omitted there, is the anconeus of Chausier and of Mr. Percivall. I have made my own alterations from the former editions, purely with a view to approach to something like general uniformity of nomenclature and description: the pupil may, with perfect safety, adopt and dissect by that of Mr. Percivall also.

Plate 7.

Fig. 1.

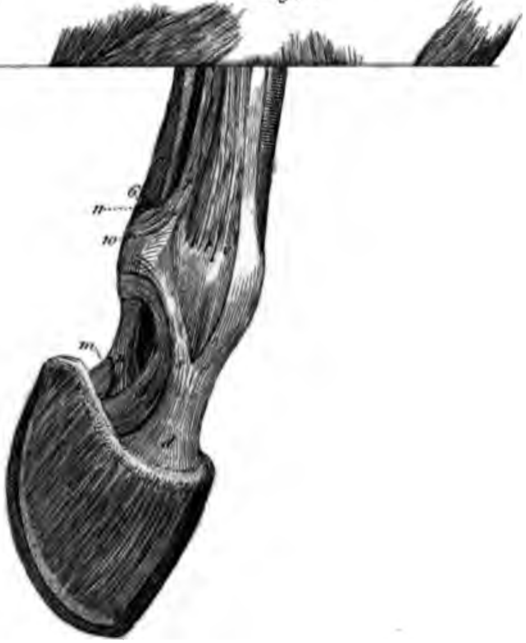
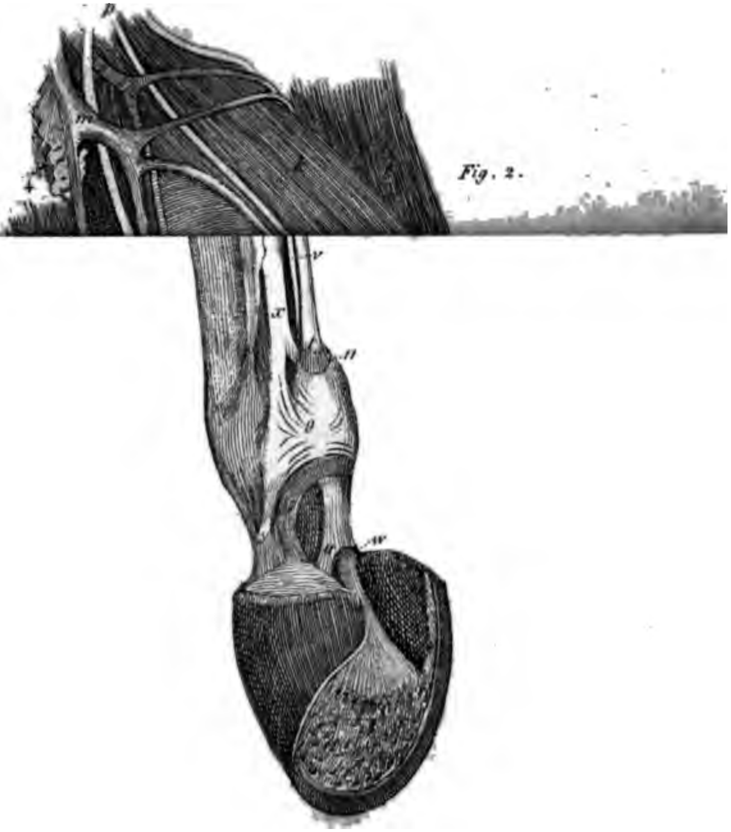


Fig. 2.



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to flexion (*s*, *g*, *h*, *fig*. 1, *pl*. 7). It is the *external extensor* of Bourgelat, and the *epitrochlo-carpeus* of Girard.

Flexor metacarpi internus arises from the posterior part of the internal condyle of the humerus; is a long thin fleshy muscle, which passes down on the inner and back part of the arm, degenerating into a small tendon which enters an appropriate sheath behind the knee, as seen (*a*, *fig*. 2, *pl*. 7); and is finally inserted into the posterior portion of the inner head of the cannon. It is a flexor to the metacarpus (*a*, *fig*. 2, *pl*. 7), and forms the internal flexor of Bourgelat, and the *epicondylo-metacarpeus* of Girard.—*Flexor metacarpi medius* arises near the former, enters a thecal sheath, and inserts itself into the trapezium: it follows the origin and insertion of the external flexor, and consequently must be assistant to that (*b*, *c*, *fig*. 2, *pl*. 7). *Epicondylo-carpeus*, Gir[*].

The *interossii muscles* are not always present, but when they are, they usually arise by two small fleshy bodies in the groove formed by the large and small metacarpal bones: when forming two small tendons, they diverge around the posterior ends of these bones, and are lost in the attachments of the flexor muscles of the foot. In one subject that I examined, they existed before and not behind; in others, I sometimes found them both before and behind; and in some not at all. Bourgelat called these, from their figure, lumbrici; and Mr. Percivall has so named them also.

MUSCLES OF THE PASTERN AND FOOT.

Extensor longus pedis anticus arises fleshy, in part from the external and lower head of the humerus, and in part from the external and superior portion of the radius, passing over the extensor metacarpi *obliquus*, semipennated. Towards the lower part of the fore-arm it becomes wholly tendinous, its cord being received at the knee under an annular ligament, which firmly binds it between two prominences in the carpus. As it passes over this joint, its tendon flattens and expands (see *fig*. 1, *pl*. 7), and becomes very smooth, by which the effects of friction are prevented; it is here also furnished with a thecal and bursal capsule, and itself furnishes cellular attachments to the joint. At the pastern a second expansion of its surface takes place; and where it also intimately connects itself with the cellular membrane of the pastern joint, greatly strengthening all its ligamentous connexions, but particularly the capsular. Towards the lower portion of the pastern it receives the lateral expansions of the suspensory ligaments (*vid. fig*. 1), connecting itself very firmly with the lower head of the great pastern, and the upper head of the small; it is finally inserted into the anterior eminence of the coffin bone, to the joint of which, and to that of the pastern, it anteriorly performs the office of a capsular ligament; for on raising it from these parts, the cavity of the joint is always exposed. (*Vid*. *c*, *d*, *fig*. 1, *pl*. 7.) This important muscle is an antagonist to the flexors, and acts on the knee, cannon, pastern, and foot; straightening all these parts, when the flexors have elevated the limb[†].

Extensor metacarpi lateralis is a long slender muscle, situated by the side of the preceding, to the first or great pastern bone. It arises from the outer head of the radius, soon becomes tendinous, and passes down through a bursa, and under the annular ligament on the anterior and rather external part of the knee; from whence it proceeds obliquely backward to unite itself with a lateral slip of the anterior ligaments, with which it is continued, and with them is inserted into the pastern, uniting also with the general metacarpal ligamentous expansion; by which, beside its immediate action on the os suffraginis, it aids the flexion of the articulations below[‡]. (*Vid*. *r*, *f*, *t*, *fig*. 1.) This small peculiar muscle is an assistant extensor.

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[*] To this list Mr. Percivall adds a small accessory flexor, ***Flexor accessorius sublimis***. I cannot doubt the accuracy of his dissections, but I cannot recognize it in Girard: nor have I any other notice in my own notes, made while dissecting, further than that the numerous connexions and attachments of the external metacarpal flexors are such, as to afford room for many further structural and functional divisions; and I therefore consider this muscle of Mr. Percivall's to be an accessory slip of flexor metacarpi medius.

[†] It is called by Stubbs, in conformity with human anatomical nomenclature, ***extensor digitorum communis***; *anterior extensor*, by Bourgelat; ***epitroklo-prephalangeus***, by Girard; and ***extensor pedis***, by Mr. Percivall.

[‡] It is the *oblique extensor* of Bourgelat, the ***extensor suffraginis*** of Mr. Percivall, and the ***cubito-prephalangeus*** of Girard.

Flexor pedis perforatus anticus.—The perforatus and perforans have been considered and described as one muscle with several heads; but though some portion of their origin is common to both, yet they are evidently distinct muscles. The perforatus arises from the posterior and lower part of the internal condyle of the humerus, between the heads of the perforans; proceeds with them, and, becoming tendinous where they also take on the same structure, it enters the ligamentous arch formed between the trapezium and neighbouring parts. It here first spreads to encase the united tendons of the perforans; but at this part the encased and encasing tendons are not united by cellular substance, but are very smooth; and though one lies within the other, lubricating mucus is always interposed between. Within this arch these tendons are firmly bound down between the heads of the small metacarpal bones by ligamentous fibres; and between them and the surface they pass over within this arch an enclosed cavity exists, which contains synovia; so that cutting the tendon through here would have all the effect of opening a joint; and by its being so firmly and closely connected to the bones, its strong contractions are prevented from rupturing or lacerating the surrounding parts. As the perforating tendon passes below the knee, encasing the perforans tendon, it receives a peculiar ligamentous expansion, by which the investing and invested tendons are more firmly connected to the bones, and kept in their proper line of action. (*Vid. s, fig.* 2.) The perforatus tendon now passing down, perfectly encases the tendon of the perforans, the whole being compacted and united together by a cellular substance; near the fetlock it enlarges, and, when opposite the sessamoids, it presents a complete ring for the investment of the perforating tendon (*t, fig.* 2, *pl.* 7), and exhibits an admirable contrivance to meet the functional exigencies; for as an evident intention is here apparent to throw the tendons farther from the centre of motion, and which tendons are here peculiarly exposed to accident, so without this they might become dislocated from each other. The joint tendons are further held in this situation by an expansion of the suspensory ligaments (*vid.* 10, *fig.* 1, 9, *fig.* 2, *pl.* 7), as well as by strong ligamentous fibres from the integuments: inferiorly they are secured by a ligamentous expansion from the pastern (*vid.* 9, *fig.* 1 and 7, *fig.* 2, *pl.* 7): so at this part the perforans is enclosed within a double theca. The perforatus tendon now passing towards the heels, bifurcates into two portions (*vid. p, fig.* 1, *u, fig.* 2, *pl.* 7), which are inserted into the upper portions of the coronet bone, but blend also with the ligaments of these parts generally. (*Cubito phalangien*, Gir.)

Flexor pedis perforans anticus arises in continuity with the former by two heads distinct, and two heads less distinct; one of which originates from the posterior part of the ulna (*vid. g, fig.* 2, *pl.* 7); two others, in some measure blended together (*vid. e, f, fig.* 2), arise from the internal and posterior inferior portion of the humerus; and a fourth still more indistinct, appearing like a collection of fibres belonging to one of the former, arises under these rather posteriorly. These portions pass down fleshy to near the knee, where the most central receives a ligament from the inner edge of the tibia, and becomes itself of a cartilaginous firmness, and is enclosed with the former tendon in a bursal sheath (*vid. r, fig* 2), the use of which must be to bind it more closely down in its action. As these heads enter the arch formed by the ligaments extending from the os trapezium, they unite to form one strong tendon, which is received into the perforatus tendon; but which does not wholly surround it, but closely embraces the whole of its posterior part (*vid. l, fig.* 1, *v, fig* 2): in the human the perforatus forms a division merely to let the perforans tendons through. As the perforans tendon passes the ligamentary arch behind the knee, it is firmly bound down to the bones as we have shewn, by which it not only operates in the flexion of this part, but its strong action is also prevented from lacerating any of the surrounding substances: at this part synovia is found interposed between the perforatus tendon and its own, and likewise between this and the pisiform bone, by which means motion is assisted, and the effects of friction prevented; but between the other parts of this and the perforatus tendon, except at the ring of the fetlock, there is merely connecting cellular membrane, but throughout their surfaces are admirably adapted to slide uninterruptedly on each other. Proceeding from under the arch of the knee, and down the cannon, invested at its posterior part in the way we have mentioned, the perforans tendon passes between the divided portions of the ligament described with the last muscle, and, continuing down the remainder of the cannon, at the fetlock is found entirely surrounded by the perforatus, which at this part becomes perfectly annular, as before noticed, to prevent the possibility of a dislocation between the two tendons at this exposed part. (*Vid.* 10, *fig.* 1, *t*, *g*, *fig.* 2.) At the heels the perforatus leaves the perforans, and is now continued alone, to be inserted by a segmental expansion of its substance into the posterior part of the vaulted arch of the coffin bone. (*Vid fig.* 2, *pl.* 7, and *f*, *f*, *fig.* 1, *pl.* 9.) The muscles, it is evident, are most important agents in progression, and flex the knee, the pasterns, and foot. We cannot omit this opportunity of stating, that these flexors are purposely divided with success in obstinate lamenesses. See *Veterinarian*, vol. vii, pp. 249. See *Division of Flexor Tendons*, in Index.

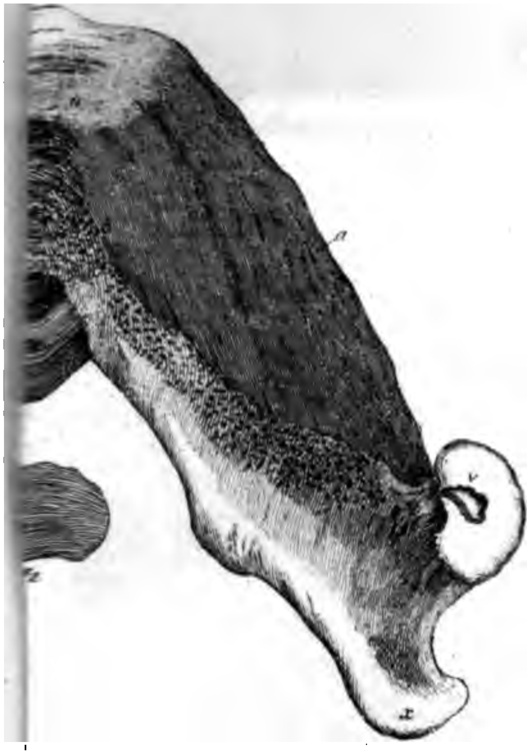
LIGAMENTOUS CONNEXIONS OF THE ANTERIOR EXTREMITY.

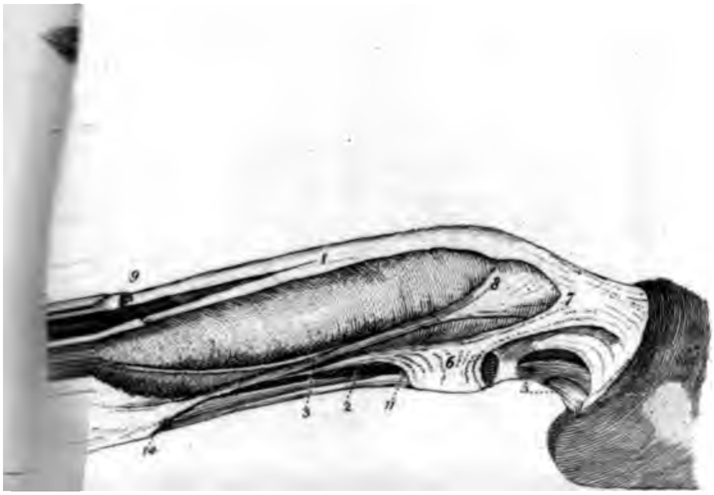
The bones of the extremity have been examined already. The integuments also have been generally considered; but a particular notice of the skin of the fore-leg will shew some structural peculiarities adapted to the functions, or to the preservation of the limb. The skin will be found at once dense and dilatable; those portions which immediately cover the joints are remarkably strong and substantial, as well as very firmly bound down to the membranous structure underneath: the elbow, the knee, and fetlock joints, are instances in point. The integuments of the fore-leg are thicker at the posterior than the anterior surface; and, with the exceptions of the parts investing the joints, are very elastic, though firm; not that they are wholly inelastic at the joints, but they are there thicker in substance and more closely confined; indeed, throughout the surface of the limb generally, an unequal degree of tenseness prevails; and in some points the union to the membranous substance is more confined than in others.—The *cellular membrane* of the limbs is also dense, fibrous, and considerable in quantity, so as to be capable of being raised layer after layer, almost without end, forming a strong investing covering to the whole: some portions of it are found to be more loose, while others are closely attached to the ligaments below; so that it is extremely difficult, in raising it, to ascertain justly what is investing cellular substance, what is fascia, or aponeurotic expansion, and what is appropriate ligament. When the outer and more loose portions of this general membrane have been removed, there appears to extend around the arm and fore-arm a general fascia formed from extensions of the muscles of these parts, which seems either to end in, or unite with, a general ligamentous expansion that covers the whole. Beside which, the fleshy bellies of the muscles of the arm and fore-arm are particularly covered by a *tendinous theca*, forming a sheath to each of them individually, and reflected over the whole of them generally; so that on removing the integuments one plain surface is seen, and the risings and depressions of the muscles themselves are rendered hardly visible.

The *ligaments of the shoulder* are, first, its *capsular*, which is very extensive and strong, having its adherences around the glenoid cavity of the scapula and the cervix humeri: externally it furnishes attachment for muscles which in their turn strengthen and free it from pressure. There are also *bursal ligaments*, appropriated to individual muscles, of which the pulley-like tendon of the flexor radialis anticus is an instance.—The *ligaments of the elbow joint* are, first, its capsular, which taking in the condyles of the humerus, and embracing the head of the radius around, forms a complete cavity: there are next two strong connecting ligamentous ties, one of which is seen to extend from the inner condyle of the humerus to the head and body of the radius; the other runs from the outer condyle, and implants itself also into the head of the radius externally.—The *ligamentous connexions of the knee* are singularly numerous, and equally complex. Mr. Percivall distinguishes five distinct articulations, and as many distinct capsular ligaments: my own dissections also perfectly agree with his in this respect; and a little consideration will prove that it is most fortunate that the general capsular cavity is thus divided, otherwise every bad broken knee must prove fatal. The *first* row of small knee bones and the end of the radius furnishes the *first* cavity; the inter-articulary surfaces of the two rows of small bones above and below furnishes the *second;* the head of the cannon and the lower row of knee bones the *third;* the trapezium and cuneiform the *fourth;* and the pisiform and trapezoid the *fifth.*

The carpal *restraining ligaments* are broad powerful bands, not easy to separate or distinguish; the general *annular* expansions are very marked and very important ones (3, *fig.* 1, where the connecting portion is cut out, distinctly shews them.) By these the tendons are at once bound firmly down in their situation, but are left unconfined in their actions; their motions being further assisted by mucous capsules interposed between their moveable surfaces. The anterior portion of the *general annular* carpal ligament (3, *b, f, fig.* 1, *pl.* 7) is seen to extend over the front of the knee, being attached to the tuberous portions of the heads of both the cannon and radius, by which it confines the extensor tendons generally, as distinct portions form individual sheaths also for each. Laterally there appear very firm bands also stretched from the inner and outer tubercle of the radial and metacarpal bones, both large and small, by which the general mechanism of the knee is strengthened. The posterior portion of the general annular carpal ligament is continued around the back of the knee, more dense and firm than that of the fore part. In stretching around the back of the carpus, it naturally meets the trapezium, to which it is strongly attached; behind this and the remaining small bones a considerable cavity or groove must exist, in which are found the flexor tendons, confined within the limits of this ligamentous arch. It will be remembered, that, on previous occasions, the importance of the size and placing of the trapezium has been insisted on; and what now appears will explain the rationale of the account. And if this bone be small, and if it do not stand out full in advance of the carpal row to which it is attached, the flexor tendons become too closely confined for advantageous action, the lever not being sufficiently removed from the central line of motion; and the defect called 'tying in under the knee' is, as is well known, a precursor of bowed legs, and early deterioration of the limb generally (3, *fig.* 2, *pl.* 7). The posterior ligamentous expansion being continued thus dense to a little below the heads of the small metacarpals, as seen at 10, *fig.* 2, becomes now further continued, but much less dense and much less straightened, to some distance below, insensibly losing itself in the general cellular membrane. It is evident that, had it continued equally tense further down, it would have greatly impeded the action of the flexors, and would have destroyed the benefits resulting from a knee laterally wide; and this, it may be remarked, does now and then actually occur, where the future descent of the ligament is bound too closely to the small metacarpals; in which case we say such a horse is not 'flat legged' or 'broad in his back sinews.' But that the circumferent ligament is truly thus continued downward, may be seen by its remains left at *z, fig.* 2, *pl.* 7, where it was removed for the purpose of exposing the flexor tendons.—The *anterior* reflection hinted at is formed from a combination of the lateral ligaments with the annular, and with two other distinct bands, one of which is in direct communication with an aponeurotic expansion from the lateral extensor, as the other is with a similar one from the long extensor (*s, u, fig.* 1, *pl.* 7). This general anterior ligamentous plane is firmly bound to the pastern, and finally loses itself in the coronet, and insertion of the extensor longus (*t, v, fig. pl.* 7).

The various tendons of the cannon and foot have each a *sheath*, or *theca*, with a vascular secreting surface, between which and the tendon a mucus is formed to prevent the effects of friction. It often happens that this secreting surface becomes inflamed from long-continued exertion or other injury done to the parts, when, instead of mucus, coagulable lymph is thrown out between the sheath and the tendon: while the inflammation remains, motion is rendered painful and imperfect; and if the lymph be not afterwards absorbed, it becomes organized, and permanent enlargement remains; such injuries are called *claps* or *strains in the back sinews.* Sinews or tendons are almost inelastic; and it is in some measure





D.P. Blair

G. Kirtland sculp

doubtful whether a sufficient extension of their substance ever takes place actually to strain without tearing their structure; but probably a small distention may rupture their fine vessels. They may be themselves ruptured, as we know, though the occurrence is rare; more frequently their sheaths give way, which accident is called *breaking down*.—For the vessels and nerves of the anterior extremities, see *Angiology*, *Neurology*, and *Lymphatics*.

Ruptures or accidental divisions of the flexor tendons of the fore and hind legs have occurred, and which lesions have nevertheless reunited, and again performed all their original functions; the knowledge of which is a proof of the importance of, and the benefits to be derived from, veterinary surgery. Among several other cases, the following may be cited: Mr. Henderson, V.S., Edinburgh, tells us, that a farrier of the name of Bracket was the first person who performed an operation of dividing these tendons to straighten a flexed limb. This was done on a horse, the property of the late Lord Hermond, many years ago. After this, similar experiments have been made, and, when operated by ingenious practitioners, the result has been usually favourable, whether it was done on the flexor tendons of the hind or the fore foot.—See *Operations in Farriery*.

Anatomy and Physiology of the Posterior Extremity.

MUSCLES SITUATED ON THE PELVIS AND THIGH, BELONGING TO EITHER THE THIGH OR LEG.

In the display of these parts in the posterior limb, I have in this edition preferred the order of description used by Girard, and in most instances I have used his nomenclature also, offering at the same time that of Mr. Percivall to the choice of the student. Where the names used in the former edition have been retained, it has only been from a conviction of their greater propriety.

Tensor vaginæ femoris.—This muscle is called, by Stubbs, musculus fascia lata, and it is so directly appropriated to that vast aponeurotic expansion which envelopes the region of the haunch and thigh, that perhaps it merited it. It arises from the anterior angle of the ilium; is connected posteriorly with the external glutei, and extends into the flank, thus appearing, at the lateral external part of the thigh, a thin fleshy expansion, which soon degenerates into an aponeurosis, uniting in some degree with that from the other muscles to cover the external part of the thigh very strongly, as well as part of the leg: being continued over a portion of the inner side of the thigh immediately under the fascia expanded from the panniculus carnosus, it inserts itself into the patella, as well as into the head and lateral part of the tibia. (*Vid. g, fig.* 3, *pl.* 6.) This muscle tends to bend and abduct the thigh; it likewise, by stretching the vaginal fascia, increases the general strength of the muscles, and as such, as well as being connected with the general fascia which envelopes the hock, &c. hereafter to be noticed, this name is a more proper one than that of fascia lata.—(*Ilio-aponeuroticus*, Gir.)

Gluteus posticus, or *externus*, is the outer of the glutei muscles, and is not, as in the human, the largest of the two: it arises by two portions; one from the anterior angle of the ilium, and one from its posterior angle: between these two heads the gluteus maximus swells into prominence, covered by a tendinous union of the two portions, from which this part of the muscle takes its origin; it then inserts itself at the small external trochanter, by a flat tendon, first giving off along the posterior side of its belly a firm aponeurosis to the muscles within the thigh. (*Vid. fig.* 3, *pl.* 6.) It acts as a flexor and an abductor. *Ilio-trochanterius medius*, Gir.—*Gluteus maximus* is not, as in the human, situated the most externally of the glutei muscles, but is placed under the former one. It is a very large mass, and fills up almost the whole of the croup, covering the external surface of the ilium and lumbar vertebræ, arising from the spinous processes of these as well as those of the sacrum, and from the anterior and superior spine of the ilium; when, contracting, it becomes interspersed with tendinous layers, and terminates by inserting itself very strongly into the trochanter major. (*Vid. f, fig.*

3, *pl.* 6.) *Ilio-trochanterius magnus*, Gir. It acts by drawing out the femur, by which it can straighten the limb, and force it outward and backward.—*Gluteus minimus.* This muscle is a small mass, immediately under the former muscle, arising from the ilium above the acetabulum, and inserted immediately under the former and into the trochanter, whose action it must assist. (*Ilio-trochanterius parvus*, Gir.)—*Ilio rotulius* rises from the angle of the ilium near the cotoloid cavity, as well as from the upper part of the femur, and inserts itself into the superior part of the patella by a very strong tendon in connexion with the next muscle. It formed the *rectus cruris* of the last edition, and the *rectus* of Mr. Percivall.—*Trifemoro-rotuleus* originates from all the anterior surface of the femur, and inserts itself into the patella with the former. The use of these fleshy masses is very great: when the leg and thigh are fixed points, their tendons must project the haunch forward, and are therefore important agents in leaping, as well as in all the paces, particularly the trot; for the body being advanced, they forcibly draw the thigh forward (*h*, *fig.* 3, *k*, *fig.* 4, *pl.* 6[*]).—*Ilio-femoralis* is a small fleshy deeply-seated slip, which may be considered either as a portion of the glutea, or as a distinct muscle, whose origin varies; but in my examinations they were from the brim of the acetabulum in connexion with the capsular ligament, which occasioned my naming it *capsularis* in the last editions, from an opinion that one, and perhaps its principal, use was that of a tensor to that ligament. Girard says it frequently originates between the tendons of the ilio rotuleus or rectus. It inserts its small flat tendon a little beneath and before the convexity of the trochanter; and he considers that it draws the femur forward, and also rotates it.—*Ischio-tibialis externus* is a considerable mass, and arises from the tuberosity of the ischium, and the whole of the inferior angle, and from an aponeurosis connected to some part of the length of the femur; it then passes down in a fan-like form, to be expanded into a broad fascia; the anterior portion of which is inserted into the anterior part of the femur and tibia its posterior covers the posterior muscles of the thigh, leg, and tendo Achilles. (*Vid a*, *a*, *fig.* 3, *pl.* 6.) The whole must powerfully flex the leg, and abduct both thigh and leg.—*Ischio-tibialis medius* vel *posterior* is found on the outer and back part of the haunch, and forms, in conjunction with the next, the posterior limits of the quarter, as well as much of its outer volume. Its origins are wide spread, as from the tuberosity of the ischium, from the coccygeal bones, and from the sacral ligaments; these several portions uniting, form a thick muscular mass, which occupies the space between the trochanter major and the tuberosity of the ischium, and is, in fact, that which gives such muscular character to the quarters of the through-bred horse. Its insertions are first aponeurotic into the upper part of the tibia, and into the fascia posteriorly. By the diversity of its origins it will act in various motions, but its principal operations are that of flexing the leg on the thigh, and of abducting the limb generally[†].—*Ischio-tibialis internus* forms the boundary of the haunch, and is placed immediately behind the last muscle, originating from the coccyx, the tuberosity of the ischium, and the sacro-ischiatic ligaments; it descends along the posterior part of the thigh, to be inserted into the internal surface of the tibia, opposite to the insertion of the preceding muscle, to which it is therefore an antagonist as well as a flexor of the leg[‡] (*c*, *c*, *d*, *fig.* 3. *pl.* 6.)

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[*] This muscle of Girard's combines the vastus internus, the vastus externus, and the crureus or cruralis of the former edition, and of Mr. Percivall also. They certainly are so much intermixed, and yet exhibit such traces of distinction, as to allow of either the present or former mode of description. I have chosen the present for uniformity. The *rectus*, by a parity of origin, insertion, and action, might also be considered as a fourth head: and from this in particular an extension of its tendon over the patella forms an union with a strong slip (*vid. pl.* 7), extending from its inferior part to the head of the tibia; the vasti also unite to form lateral bands in connexion with the tibia, and the powerful fascia by which this joint is environed. The joint action of these muscles must be greatly increased by their insertion in the patella, by reason of elevating their tendinous insertions from the centre of motion.

[†] This was *biceps flexor cruris* in the last edition, and it was there stated to be inserted into the patella: and with due deference to M. G., I am still inclined to think it does so insert itself (provided we mean the same muscle); and I am the more inclined to be of this opinion from Mr. Percivall's dissections, who distinctly states that it 'inserts itself into the outer border of the patella,' (*vid. b*, *fig*. 3, *pl.* 6).

[‡] This formed the *demimembranosus* of Bourgelat, and both the *semitendinosus* and *semimembranosus* of Mr. Percivall; it is also the *semitendinosus* of Stubbs; and was called *flexor cruris posticus* in the last edition.

—*Ischio-femoralis* is a small fleshy mass, very deeply seated among the former muscles, arising from the region of the acetabulum, and being inserted into the femur behind the great trochanter.

MUSCLES ON THE INSIDE OF THE THIGH.

Subpubio-tibialis is the broad, thin, fleshy expansion which first appears on the inner side of the thigh on removing the integuments and fascia; it arises from the symphysis pubis, and from the ischium, and terminates by an aponeurosis, which covers the internal part of the thigh, and more particularly ends in the superior and internal part of the tibia. (*Vid. b, fig.* 4, *pl.* 6). It rotates the thigh, and bends it inwards. (*Gracilis*, P. and Bl.)—*Sublumbar-tibialis* is a long thin muscle, originating from the brim of the pelvis, and passing obliquely across the psoas and iliac muscles to terminate in a small tendon attached with that of the gracilis to the upper and lateral internal part of the tibia. It flexes and adducts the leg and thigh. (*Vid. h, fig.* 4, *pl.* 6). (*Sartorius*, P. and Bl.)—*Superpubio-femoralis* arises from the pelvis near the pubis, is inserted below the internal small trochanter, and draws the thigh inwards and upwards (*i, fig.* 4, *pl.* 6). (*Pectineus*, P. and Bl.)—*Subpubio-femoralis* originates from the inferior surface of the pubis, and is inserted by two portions (from whence Bourgelat called it the biceps adductor), one of which attaches itself to the body of the femur behind the pectineus; the other and longer inserts itself into its internal condyle: it is the use of both heads to adduct the thighs together (*a, a, fig.* 4, *pl.* 6.)[*]—*Subpubio trochanterius externus* is situated without the pelvis, and arises from the inner crus of the ischium, from the foramen magnum, and from the obturator ligament: collecting it fibres, it passes rather around the root of the back part of the neck of the femur; and is inserted by a strong tendon into the cavity at the posterior part of the great trochanter. Though it is a short muscle, yet, by its direction and its numerous points of contact, it can act with considerable strength in rotating the thigh inwards, directly contrary to the action of the same muscle in the human. (*Obturator externus* of P. and Bl.)—*Subpubio-trochanterius internus* arises within the pelvis from the same foramen, and from its ligamentous covering; it then passes the angle of the ischium, in company with the crural nerve, and is inserted with the next pair. (*Obturator internus*, P. and Bl.)—*Ischio-trochanterius* or *Gemini* are two slips which arise, one superior to the other, from the ischium and pubis, near the junction of these bones; and are inserted along with the preceding muscle, to which they are antagonists.—*Pyriformis* arises within the pelvis from the sacrum; passes out at the niche in the ischium with the posterior crural nerve, and is inserted with the gemini, assisting them in their action.

THE MUSCLES OF THE CANNON.

Femoro-tibialis obliquus may be described either as belonging to the leg or cannon, whose situation is at the inner side of the back of the articulation of the femur or thigh with the tibia or true leg-bone, deeply embedded with the muscles which follow in the crural or popliteal region. It may be described as arising in a considerable mass from the inner surface near the head of the tibia; (*e, fig.* 1, *pl.* 8) its fleshy fibres, directed obliquely upwards and outwards, terminate in a short strong tendon into the outer and under part of the external condyle of the femur (*y, fig.* 2). It altogether attaches the articulation, and extends the capsular ligament, over which it passes; it also flexes the stifle, and turns the hock inwards. (*Popliteus*, P. and Bl. and the *abductor of the leg* of Bourgelat).—*Tibio premetatarseus* originates by a strong tendon (*d, fig.* 2) from a cavity on the anterior part of the external condyle of the femur, which passing inwardly, is received by the fleshy part which arises from the cavity behind the anterior spine of the tibia for nearly its own length, and is continued down within it. Gradually, however, this fleshy portion itself becomes tendinous, and then in turn surrounds the tendon of the first origin, and, coming out from that (*vid. m, fig.* 1, *p, fig.* 2), it it bifurcates into two branches, one of which is longer, and expands to insert itself on the inner side into the lateral or posterior part of the cannon, and the inner splent bone: the other, and shorter, is inserted into the anterior and superior part of the head of the cannon. The investing tendon (*vid. n, fig*, 1, *o*, *fig*. 2) likewise divides into two branches, which attach themselves near those of the former portion, but rather superiorly. By this peculiar mode of insertion of its tendon, this necessarily acts with great force and advantage, embracing numerous points of contact, and acting upon several parts of the hock at the same time, and by these means strongly flexing the cannon. *Flexor-metatarsi*, P. *Tibialis anticus*, Vet. Out. third edition)—*Bifemoro-calcaneus* (*Gastrocnemius externus*, P. *Gastrocnemius*, Bl.) is a powerful but complex muscle, situated at the back of the thigh; it arises by two portions, an outer and inner; the outer from near the external condyle of the femur, and the inner from the opposite condyle of the same (*h*, *h*, *fig*. 1, *pl*. 8); both portions pass down intermixed with tendinous fibres; when from the union of the two is formed a flat tendon, which after making several spiral turns, passes under the tendon of the next muscle, and after forming cellular attachments with the other tendons, is finally inserted on the point of the hock (*vid. pl*. 8, *fig*. 1). Bourgelat expressively names this the *grand extensor* of the cannon, and it certainly is one of the most important muscles concerned in progression, for it is inserted at the extremity of one of the most powerful levers of the body. When the hinder limbs are flexed, or, as a horseman would express it, 'thrown under the body in action,' this muscle contracting, closes the angle formed between the calcaneum and the tibia, and in so doing forces the body forward by making use of the fixed points formed by the feet in their descent to the ground. Viewing it thus, it will be apparent how much of progressive motion depends on this muscle; and how much more advantageously it can act on a wide-spread hock, i. e. a long os calcis, than on one less favourably formed.—*Peroneus-calcaneus* (*Plantaris*, P. *Plantaris*, Bl.) is situate beside the last, as a long thin fleshy slip, whose small tendon unites itself with that of the former, and follows its insertion.—*Femoro-phalangeus* (*Gastrocnemius internus*, P. *Flexor pedis perforatus posticus*, Bl.) arises near the origin of the gastrocnemius in the cavity behind the condyles of the femur: proceeding downwards, it passes from the inner side of the tendon of the gastrocnemii to the outer and posterior part, and below receives a powerful ligamentous expansion, at *p*, *fig*. 1, *x*, *fig*. 2, by which it is bound closely to the hock; here it becomes expanded to receive the point of the os calcis into a kind of sac or cap, in which synovia exists; so that here also a wound of this part, sufficiently deep to penetrate the tendon, would have the effect of opening a joint. It then runs down the posterior and inferior part of the hock, and is seen in *fig*. 1 and 2, having its ligamentous connexions cut off to shew its progress as it proceeds to meet the perforans tendon, which it passes to the outside, and surrounds the outer portion of: continued down, it wholly encircles the perforans tendon at the pastern (*vid. b*, *fig*. 2), in a similar manner as in the anterior extremities; when running through an expansion formed jointly from the elastic suspensory ligaments, and that extended from the small metacarpal bones, it bifurcates into two portions (*vid*. 4, *fig*. 2), which are inserted one on each side of the large pastern, at its inferior part.—*Tibio-phalangeus* (*Flexor pedis*, P. *Flexor magnus pedis perforans posticus*, Bl.) arises from the posterior and external parts of the head of the tibia; continuing down, it receives oblique fleshy fibres from its posterior surface, which pass into its tendon (*vid. k*, *fig*. 1) from the inner edge of the tibia, and some from the outer edge; between which are seen the posterior tibial artery, and some small branches of the vein and nerves. At the beginning of the hock the whole becomes one strong tendon, which enters into a groove, formed on the inner side of the calcaneum, and slides upon the articulation of the tibia and hock under the general annular ligament, having a cartilage interposed for the purpose of preventing friction. (*Vid. r*, *fig*. 1, *t*, *fig*. 2.) After this passage it comes in contact with the tendon of the perforatus muscle (*z*, *fig*. 1), and is continued down on its inner side, having its posterior part covered by it, till it arrives at the pastern, when it becoming surrounded by the complete ring of the perforatus, it is inserted, as in the fore-extremities, on the coffin bone. The metacarpal nerve accompanies the gastrocnemius muscle at its origin, and continues down on the edge of the tendon of the perforans, passing with it through the annular ligament on its outer side; it then gains the inner side, and runs within it, to be divided and distributed over the foot and pastern (*vid. r, fig.* 1, *just above which it is seen*). This and the preceding muscle are the flexors of the foot, but this latter is more immediately so; while the former, which is much more complex in its terminations, and more divided in its uses, appears to belong to the hock, cannon, and pasterns also; and forms a medium, whereby the actions of all the parts are uniform and consentaneous.—*Peroneo-phalangeus (Flexor pedis accessorius* P., *Flexor minus pedis posticus*, Bl.) arises near the posterior part of the head of the tibia; passing down on the outer side of the popliteus, it bends its course obliquely inwards, and under an annular ligament at the lateral internal part of the hock (*vid. fig.* 1): about the middle of the cannon (*vid.* 2, *fig.* 1) it unites with the preceding, and to which it is thus an assistant.—*Femoro-prephalangeus* (*Extensor pedis*, P. *Extensor longus pedis posticus*, Bl.) This is one of three muscles, by which the extension of the foot is performed. (*Vid. n, fig.* 2.) It appears to arise tendinous in connexion with the tibio premetatarseus from around the tendon of the flexor of the cannon, as well as by some tendinous fibres of its own; and also from the head of the tibia at its outer part; it is then continued down in front of the shank, and becomes formed into a strong tendon (*vid. r, fig.* 2), which passes under the annular ligament, in close union with the tendon of the peroneo-prephalangeus to the bottom of the cannon; when, separating, it is continued over the front of the pastern, connected by the suspensory ligaments (*vid.* 7, *fig.* 2); it inserts itself, as in the fore-leg, into the anterior eminence of the coffin-bone, and, like that, its use is to extend the foot.—*Peroneo-prephalangeus. Peroneus*, P.[*])—*Extensor lateralis pedis* forms the lateral extensor of Bourgelat, and is similar to the peroneus longus of the human; arising by a tendon from the head of the fibula; running down it becomes tendinous, and joins the artery some way under the annular ligament; then, passing obliquely on the cannon, it unites with the tendon of the last muscle, as already noticed (*vid. fig.* 2), to the pastern, where a partial division around that takes place, but leaving their joint insertion the same below[†].

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[*] This biceps muscle and the ischio-tibialis together constitute the three heads of Mr. Percivall's *triceps adductor*, and also the triceps adductor of this work.

LIGAMENTOUS CONNEXIONS OF THE POSTERIOR EXTREMITY.

On removing the skin from the croup, thigh, and leg, the muscles are so covered and held down by a tendinous expansion, of extreme firmness, as to be very indistinct until it be removed. This dense covering, called *fascia lata*, is found, in full-fed horses, besprinkled over with adipose matter, and intersected by the ramifications of the cuticular nerves. It is not an individual extension of any one muscle, or of any set of muscles; but is jointly formed by all, yet necessarily some yield a larger proportion than others. From above, it receives the fascia of the external oblique, by which it spreads over the haunch in connexion with portions furnished by the muscles of the back generally. It is strongly attached to the bony prominences, as those of the tail, the buttock, and the hip; and in many places, further to strengthen its attachment, it dips deeply between individual muscles, emplanting itself into the bones underneath. It is particularly strong over the whole surface on the outer side of the thigh and leg, becoming thinner, and intermixed with ligamentous covering proper to the cannon. It greatly assists motion by confining the muscles within their proper line of action. The integuments are also found thickest on the outside of the limb, and particularly so over the more exposed parts of it, as around the hock, the cannon, pasterns, and fetlocks, to which they are strongly connected by a dense cellular membrane.

The articulations generally are furnished with strong appropriate ligamentous bindings *that of the thigh with the pelvis* is so formed as to render dislocation between the parts a very rare occurrence. The acetabulum is deepened by a *ligamentous ring*, and its notch is prevented from offering an escape to the bone by the *transverse ligament:* the capsular ligament being thickly surrounded with muscular fibres, must add to the firmness of union as it courses the cervix of the femur and brim of the acetabulum (*fig.* 1, *pl.* 8): but the principal strength of the joint is derived from the *ligamentum teres*, which is connected by one end to a cavity in the head of the femur (see r, *fig.* 1, *pl.* 8), and by the other to a similar cavity in the acetabulum. The *articulation of the thigh-bone with the tibia and fibula*, constituting the *stifle joint*, is formed likewise with great art and strength; and that the muscles extending these bones might act with greater power, there was given a detached bony piece or patella (the whirlbone of the farriers), which allows them to move on the parts below without incumbrance, or without interrupting the ease of motion. This bony appendage is retained in its situation by means of very strong ligaments, assisted by the fascia and tendons. One of these, placed before, appears jointly formed of the rectus tendons extended over the patella, and is continued with a ligament from its inferior and anterior portion into the cavity in the front and head of the tibia (see *d*, *fig.* 1, 10, *fig.* 2): another, arising from its outer side, is united to an expansion of the vastus externus muscle, and is inserted into the external part of the tubercle of the tibia. (See *c*, *fig.* 1, *b*, *fig.* 2.) A third slight one, which is removed in the plate to shew the joint, arises from the inner side of the patella, is continued with an expansion of the vastus internus, and inserted on the inner side of the head of the tibia. A fourth, coming from its outer side, inserts itself into the external condyle of the femur; there is likewise a correspondent one on the inner side, and, independent of these, there are lateral cords carried across the patella; and the capsular ligament, which circumscribes the whole, adds somewhat to the general security; as the *semilunar cartilages* (3, *fig.* 1, *e*, *fig.* 2) add to the ease of motion: but notwithstanding these safeguards, the patella is occasionally dislocated. The femur and tibia are held together principally by means of the *crucial* or *cross ligaments*, which originate from the posterior part of the femur, when, crossing each other within the joint, they are inserted into the head of the tibia: a *posterior* ligament arises within the articulation behind these between the condyles, and terminates in the hinder part of the head of the tibia; which prevents it from being dislocated forward, as the crucial prevent both of these bones from being rotated or twisted on each other. There are likewise continued on each side, from the condyles to the femur, tendons which answer the purpose of lateral ligaments. On the outer side this is effected (*vid. f*, *fig.* 2) by the tendon of the lateral extensor of the foot; and on the inner side by an expansion formed of part of the triceps, and vastus internus muscles.

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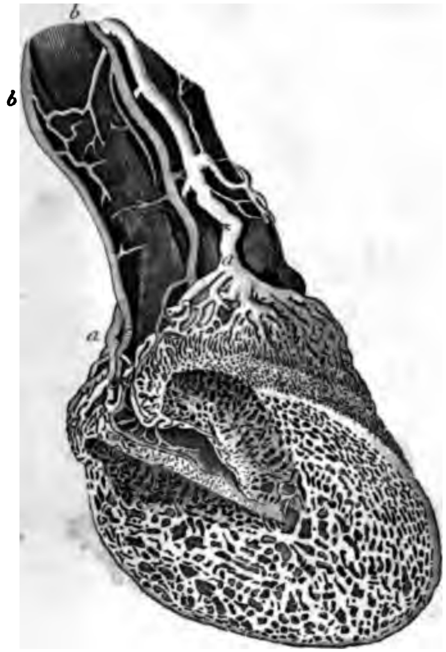
[*] Mr. Percivall observes of this, 'that it is the only *peroneal* muscle the horse has.'

[†] At 9, *fig.* 2, may be seen some fleshy fibres continued obliquely between the tendons of these muscles, which have been considered as of sufficient consequence to constitute a *minor extensor*, and were so designated in the last edition; but though strictly muscular, and evidently intended to approximate these tendons, and thus to assist their action, they hardly merit a separate nomination

The *hock, as a joint*, is strong, and its mechanical arrangement cannot fail to excite our admiration: much pains therefore have been taken to make both the description and the graphic views of the parts composing it, clear and intelligible. It is covered in common with its vicinage by a very dense cellular substance intermixed with ligamentous fibres of great strength, and when many of these have been removed in successive layers, there will yet remain a close expansion apparently derived from the fascia of the semimembranosus and tensor vaginæ femoris, which is extended over the muscles of the tibia. If this expansion be raised from the front of the leg, it seems to thicken as it gains the hollow formed between the tendo Achilles and the flexor of the foot, at which part it is very firm, and appears to end in two ligamentous bands connected apparently with a tendinous expansion from the perforatus muscle (*p*, *fig.* 1, *and x*, *fig.* 2). The capsular ligament of this joint arises from the tibia, unites with the fascial expansion, and is continued over its various bones to the superior extremity of the cannon. At the bottom of the tibia may be observed an articulary cartilage, held in its situation by an appropriate ligament, interposed between the posterior and inferior head of that bone, and the tendon of the flexor of the foot. It is not improbable that some of the inveterate lamenesses of the hock, and even stringhalt, where no enlargement appears, arise from an ossification of this cartilage. (*Vid. r*, *fig.* 1, 12, *fig.*



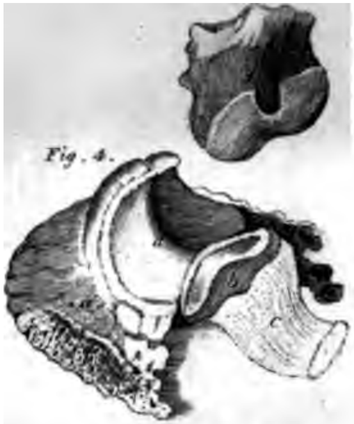


Fig. 4.

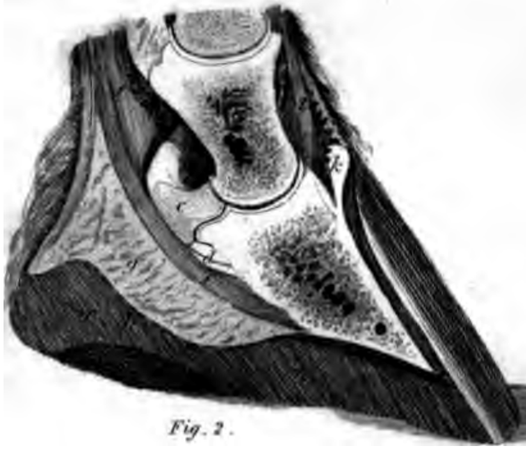


Fig. 2.

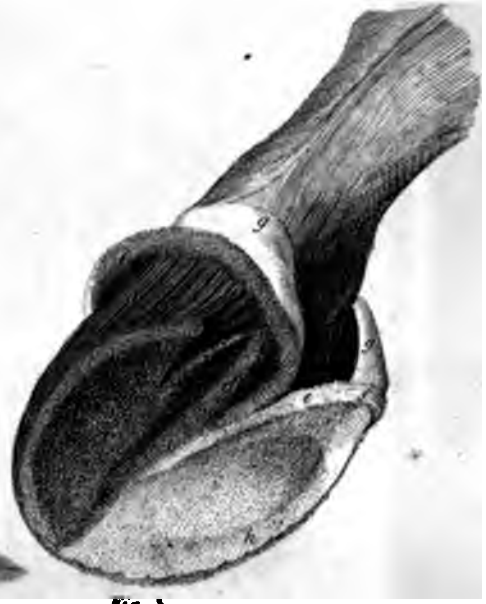


Fig. 3.

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2). There is likewise a very strong ligament at the posterior part of the astragalus, *below v, fig.* 2, and continued over these bones, and the small metacarpals, serving to connect them with the cannon. It is this posterior ligament that becomes affected in the disease called the *curb*. The *annular ligaments of the hock* appear to arise from the same dense general expansion of this joint intermixed with some appropriate ligamentous bands. Having formed common and individual sheaths to the tendons, it is continued to some inches below the hock, near to the origin of the elastic bifurcating ligaments, where it appears to be reflected over, from one small metacarpal bone to the other. It now follows the front of the cannon, binding the extensor tendons to each other, and is again reflected from the sides, leaving the flexors uncovered, that thereby they might not be impeded in their motion; for were they bound too closely, they would be prevented from acting to advantage, as situated too near the centre of motion; but which is directly the reverse with the extensor tendons, whose situation is such that they can only act when closely applied to the cannon. The tendons have most of them an individual sheath, independent of the general thecal investment of the whole: within the sheaths, near to the termination of such tendons as have considerable actions to perform, and whose motions are extensive, are placed mucous capsules, or *bursæ mucosæ*. The mucus furnished from the secreting arteries of the part, from violent or long-continued action, is apt to become morbidly increased, and then forms what is erroneously called *windgall*. Occasionally, to the increase, a disposition to concretion is added, and the enlargement becomes solidified. The usual situations of these swellings are in the bursæ of the hock behind (*vid.* 3, *fig.* 1), and in the pasterns (11, *fig.* 2), both before and behind. The sheaths and bursæ of the flexor tendons of the cannon are also frequently the seat of these enlagements, as likewise those of the flexors of the foot (*h and l, fig.* 1). *Blood-sparin* is the consequence of bursal disease of the tendon of the little flexor of the foot (*l, fig.* 1); for a superficial branch of vein, passing over the inside of the hock, becomes by this means pressed upon, and its efforts to overcome the obstruction occasion an increase in its coats. The investing fascia covers also a bursa at the point of the hock, which is liable to a diseased enlargement similar to the others, and is then called a *capulet.*—For an account of the ligamentous connexions of the joints below, I would refer to the description of the anterior extremities, the one being similar with the other.

THE STRUCTURE, FUNCTIONS, AND ECONOMY OF THE FOOT.

DESCRIPTION OF PLATE IX.

Fig. 1.—A foot, with the arteries and veins injected with wax, from the pasterns; *a a*, the plantar veins ramifying over the foot, so as to form a complete network; *b b*, the plantar arteries.—*Fig.* 2. A foot sawn down the middle; *a*, os pedis or coffin bone; *b*, os coronæ or coronet, or small pastern, but which is here represented rather too long; *c*, os naviculare or navicular bone, confined by its ligaments; *d d*, ligaments of the navicular bone; *e*, flexor tendon of the coronary bone; *f f*, flexor tendon of the coffin bone; *g*, sensible frog; *h h*, sensible sole; *i*, sensible laminæ; *k*, coronary ligament; *l*, extensor tendon of the coffin bone; *m*, horny or insensible frog; *n*, horny sole.—*Fig.* 3. A foot without the hoof; *a*, sensible laminæ; *b*, laminæ of the sole continued from the front round the heels; *c*, sensible sole; *d*, sensible frog; *e*, cartilaginous part of the frog continued from the lateral cartilage; *f f*, vascular coronary ligament; *g g*, lateral cartilages.—*Fig.* 4. The coffin, the navicular, and the coronary bones, with the flexor tendon attached, to shew its connexion with these bones; *a*, the coffin bone deprived of its left lateral cartilage; that of the right remains, but lessened and ossified; *b*, navicular or shuttle bone; *c*, flexor tendon passing under the navicular bone to be inserted in the arch of the coffin bone; *d*, articulating cavities in the coffin and navicular bones; *e*, a groove for the passage of bloodvessels between the lateral processes of the coffin bone; *f*, the little pastern or coronet bone.

The Anatomy and Physiology of the Foot.

The foot of the horse presents a mechanism truly wonderful and curious, and most admirably adapted to the habits and manners of the animal; and here all the complexity of structure, exhibited in the numerous phalanges of the quadrumana, is found united in one. From the various artificial circumstances to which we subject this noble quadruped, such as stabling, hard roads, and the attachment of iron shoes, the feet become peculiarly susceptible of disease; and as progression is the very foundation of the utility of the animal in question, so these diseases become objects of the greatest import to the veterinarian; to the proper understanding of which, an intimate acquaintance with the structure and economy of the parts composing the feet is absolutely necessary. My circumscribed limits will curtail much extent of detail here; but the works of Mr. Coleman, Mr. Clark, and Mr. Freeman, will supply minutiæ, and to them I would refer the student. At birth, the horny parts of the feet are found less evolved than most other of the external organs; were they more perfected, their hard surfaces might bruise the mother: at this early period the pasterns are long and upright, and instead of the extremities ending, as in the adult, in a broad extended base, they terminate in a small circle of horny matter, pointed in front and behind, and present only the rudiments of a frog. The bones immediately belonging to the foot are two, the coffin and the navicular: the little pastern, or coronary bone, which articulates with both of these, is also partly hidden within the hoof; but though intimately connected with the economy of the organ, has no pretension to be called a foot bone. The *coffin bone* corresponds in shape to the cavity of the hoof: in front it presents an eminence, to which the extensor tendon is attached; its sides stretch back into two lateral processes or wings, to the upper surface of which are fixed the lateral cartilages: its superior surface presents two articular cavities, and its lower is vaulted, and attaches the flexor tendon; while its anterior is covered by the sensible laminæ (*vid. y, pl. of Skeleton; vid. a, fig.* 2, and *a. d, fig.* 4, *of pl.* 9). It will be seen to be of a spongy but adhesive texture, with small bony ridges extending from above downwards, favouring the attachment of the sensible laminæ. It is very strongly secured from dislocation from its fellow bones, and from its general connexions, by the capsular as well as by other ligaments, which stretch from the edges of its alæ to the coronet; from behind also to the same; and likewise by its cartilages. The *navicular bone*, which in figure resembles a boat or shuttle, embeds itself between the posterior processes or wings of the coffin bone, to which it is attached closely; first, by a broad ligament which extends from it over the extensor longus, to be strongly inserted in the coffin bone; next, by an upper ligamentous band which binds it with the tendo perforans; and, lastly, by the capsular ligament, which includes in its grasp this bone, the coffin, and the small pastern bones*.

The *coronary*, or *small pastern bone*, is seen in *fig.* 4, *f*, and *fig.* 2, *b. pl.* 9, and articulates with the coffin and with the navicular bones, to both of which it is united by the capsular and the lateral ligaments. The *lateral cartilages* affixed, one to each side of the coffin bone by indentation, are externally convex, and internally slightly concave, their upper surface stretching upwards beyond the confines of the hoof. The *laminæ* are vascular, sensible, and elastic productions of the cutis, situated round the anterior surface of the coffin bone, which are received between correspondent horny lamellæ protruded from the hoof. The *coronary ligament* is a vascular expansion, projecting and extending around the coronet to the back of the frog; from the vessels of which the hoof is secreted. The *extensor tendon* passes in front of these parts into the anterior eminence of the coffin, and the *flexor tendon* affixes itself to the vaulted arch posteriorly. The *sensible frog* is situated next to this, on which and on the flexor tendon the navicular bone rests. The *sensible sole* lies under that part of the coffin covered by neither of these latter substances, while the *hoof*, a hard insensible box, covers and protects the whole. Having thus outlined the parts of this order, we shall retrace them in a contrary one, by which the student will become familiarized therewith, individually and collectively.

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* The synovial capsule, between the articulatory surfaces of the coffin and navicular bone, appears, by the aids of morbid anatomy, to be peculiarly the seat of *groggy* lamenesses.

The *hoof* is a horny envelopement, secreted from an expansion of the cutis, exactly as the human nail is formed from what is termed the *quick:* it is distinctly composed of fibres parallel with each other in their oblique descent from the coronet to the toe, and held together by a glutinous horny exudation which maceration will separate. Inordinate heat and dryness will also do the same in the living hoof, as we know by what are called sandcracks. The hoof in its *natural* state is conical, but by no means so perfectly so as has generally been taught. Mr. Bracy Clark expressively describes it as an oblique cylinder truncated, having its truncated extremity opposed to the ground: but age and artificial habits tend much to alter its natural appearance. Both the obliquity and the height are greatest in front, lessening from thence to the heels: in a natural state it is also widest at the outer side of the inferior margin, by which a broader surface of support is afforded without encumbering motion, or increasing a tendency to strike the opposite limb. The *walls* or *crust* of the hoof are the circumferent portion visible when the foot is placed on the ground, and, in a healthy state, is smooth and uniform[*]. The *quarters* are the lateral parts of the walls or crust; and, as in the fore feet, the anterior portion of each hoof is the thickest, as being the most exerted and the most exposed; so, in the hinder ones, the sides are by much the strongest; thus we nail the fore shoes principally towards the front, but the hinder ones towards the quarters. In the usual formation of feet, the inner side of the hoof is observed to be both weaker and higher than the outer, a circumstance which is not sufficiently attended to by the operative smith, and the neglect is often the source of lameness. The general substance and density of the hoof decreases as it approaches the heels, evidently to favour the expansibility of the horn and the descent of the elastic pad. The superior marginal part of the hoof is softer and thinner than the rest; and if, from the outward surface, our eye be directed inward, we shall perceive an indentation called the *coronary ring*, which receives within it the *coronary ligament* already noticed[†] (*vid. k, ff, fig.* 3, and *k, fig.* 2, *pl.* 9). Immediately contiguous to this ligament, but rather under it, exists an elongation of dense substance, very similar in structure with the circle of cuticle which overhangs what we term the *roots* of our nails.

To finish our description of the hoof, we must turn our attention posteriorly, where we shall find the horny heels inflecting themselves abruptly inwards, having the intermediate space filled up by the fleshy or soft heels. The hoof is subject to wear and decay, but, like our nails, it is continually reproduced by fresh secretions of horn; and how speedily the process of renovation is executed, we have many instances of observing in veterinary practice: the superfluous portions of horny matter desquamate, and fall off in flakes.

The *horny sole*, or under concave elastic surface of the hoof, is (*vid. n, fig.* 2, *pl.* 9) not so fibrous or brittle as the crust; it is thickest at the circumference, where it unites with the outer walls of the hoof, than it is towards its centre. Its concavity admirably adapts it to embrace the ground, and enable the foot to retain its situation; while it forms a point of resistance to the pressure from above on the best principles, those of the arch, and yet yields by its elasticity from above downwards, thus affording a spring also. The *horny frog*[‡] is the triangular portion that fills up the natural excavation of the under surface of the hoof. (*Vid. m, fig.* 2, *pl.* 9.) This elastic pad swells itself out beyond the immediate part it is in contact with, but not so much in general cases as to extend beyond the level of the outer surface of the crust; it however is sufficiently prominent in every healthy foot as to receive its full share of pressure. A horizontal section of the foot will shew the frog to be completely a distinct secretion from the other horn: it is not only structurally different, but presents also a distinct line of separation between it and the horny parts it is connected with; and which connexion is principally kept up by an internal prolongation of cuticular matter throughout all these parts. It is also intimately connected to the sensible frog above by the inosculation of vessels; and still more forcibly by an extension of itself indented with the sensible substance, as may be seen in the section of the foot, *pl.* 9. The posterior superior part of the frog is covered by the fatty elastic substance, into which the sensible sole blends itself, forming the soft sensible heels: from whence its lateral parts appear to be continued by a true prolongation; or, otherwise, a firm lamen of elastic horny matter is reflected from it to spread over the under part of the coronary ring immediately below the vascular coronary ligament. Mr. Bracy Clark, who, we believe, first accurately described it, calls it the *frog stay*, its use being, as he supposes, to support the frog in its situation. Mr. Coleman, I believe, denies its existence altogether; but an accurate dissection of the parts certainly demonstrates a prolongation of the frog, or otherwise a continuation of an elastic matter reflected from it; and its existence is, I believe, now generally recognized.

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[*] Hoofs, however, not in a state of much disease, will yet appear with longitudinal rings around them, frequently the effect of accidental circumstances, as change of situation from the stable to pasturage, &c.; for as heat, high feeding, and violent exercise, tend to limit the expansion, so the opposite extremes, when brought to alternate with these stimuli, again encouraging a full growth, naturally produce inequalities in the horny circles, formed during these different states of the animal.

[†] Although coronary *ligament* is a term given by an authority to which the veterinarian ought to bow (that of Mr. Coleman), its strict propriety may be questioned. It appears less ligamentous than a true elongation or fold of the cutis, is of a very highly vascular texture, its surface being covered with villous secretory projections, from whence the horn of the hoof is principally formed. This is its evident functional capacity, and it does little towards attaching the hoofs to the internal parts, as we know by the ease with which it may be torn from its connexions in a recent subject; and because there is evidently a distinct apparatus, yet to be noticed, for this especial purpose.

[‡] The elasticity of the horny sole yielding to the pressure of the parts above, occasions a momentary descent during the forcible placing down of the limb, which must approximate it still more to the

It may not be amiss to notice here, that the quantity of horny matter, even in a full-formed frog, is not so great as might be supposed from a hasty inspection of the under surface of the foot; for the horny frog is placed as an inverted arch over the sensible frog above it (*vid. g, h, fig.* 2, *pl.* 9). It is, therefore, evident that an unlimited paring away of the horny frog is dangerous: but in extent of plane surface, the frog, in its natural state, forms not less than a sixth of the whole. Between its bifurcations a deep sinuosity appears, called its *cleft;* by means of which it possesses a power of expansion, and also a capability of adapting itself to the uneven surfaces the foot may pass over. The formation of the horny frog is effected by secretion from the vascular sensible frog immediately over it, and is hence subjected to the same laws with the horny parts of the hoof and sole, scaling and detaching itself, when overgrown, as they do*.

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earth; and as the hard edges of the crust must indent themselves deeply in the surface of the ground on most occasions, it leads into erroneous views of this part of the apparatus to suppose it free from pressure: on the contrary, although the pressure may not be long continued, yet it would appear that in the unshod horse, when ranging at large, the descent of the sole is sufficient to relieve the crust and laminæ by coming into contact with and resting upon portions of the earth's surface at each descent. If this be true, we have another reason to apprehend contraction as one of the necessary consequences of shoeing, inasmuch as it must still further remove the sole from healthy because natural pressure; and by thus depriving the foot of the assistance to be derived from it, and transferring all the weight to the crust and laminæ, the want of it must tend to approximate the walls of the hoof more in a shod than in an unshod horse. In thus arguing, I will suppose the descent of the sole to be taken for granted; if not, let the doubter exactly fill up the hollow of a shod foot with any plastic mutter, levelling it off exactly with the under surface of a perfectly plane shoe; after putting a die of any kind on any level surface, let him place the horse's foot directly and centrally over it. Having so done, momentarily elevate the contrary foot, and afterwards lift up the experimental foot, when, on examining the die (we will say one quarter of an inch thick), it will be found indented into the plastic matter half of an inch, more or less, according to circumstances, but some descent always takes place. It becomes, therefore, imperatively necessary for the operative smith to keep this circumstance always in mind; for the sole is so constituted, as, by its elasticity, to resist any injurious consequences from *momentary* pressure, yet of considerable force even; but the course of its fibres will not bear *long-continued* pressure of a slight kind: thus, if a shoe be placed so as to allow any part of its surface actually to rest on this horny sole, it must, of course press the vascular surface of such sole between the edges of the coffin bone and the hard outer surface of horn during the descent of the arch. When the shoe simply *lies* on the sole, it creates pain and slight inflammation from the mere descent of the sole, and such a horse goes tender, and is said to be shoe-bound. When, in addition to this, the shoe also *presses* on the sole, then the joint action from above and below aggravates the evil, and inflammation and abscess follow.

* This growth of the frog has led into many erroneous practices; by some it has been supposed necessary on all occasions to pare much of it away; but when its functions are duly considered, it will be concluded that no more should be removed than would be sufficient to copy Nature in her detrition. In some feet the growth of the frog is hardly commensurate with the wear: and, in such cases, an imprudent smith may pare more away in three minutes than will grow in three months.

Modern physiologists have been very much divided in their opinions relative to the *use* of the frog. La Fosse insisted on the impropriety of paring it away, as it appeared to him both as a guard to the tendon, and as assisting the navicular bone in its office of a spring. Mr. Freeman considered it in a similar point of view, and also that, in conjunction with the navicular bone, it greatly assisted the spring of the tendon. Mr. Coleman denies its office as a guard to the flexor tendon, from the nature of its situation; and argues, very ingeniously, to prove that its principal and determinate use is, to prevent contraction in the hoof, and, subordinately, displacement of the foot by slipping[*]. But if we take an extended view of the matter, and call in the aids of comparative anatomy, that generalizing and sure guide, we shall be, I think, led to consider its uses as of a mixed nature. Eminently simple in form and structure, it combines even more than the qualities possessed by the tendo-cartilaginous balls at the posterior part of the feet of the digitated tribes, as dogs, cats, &c. It is more dense in structure, to resist the weight imposed on it; yet more truly elastic, to enable it to preserve its own intensity under the increased pressure of so large an animal, and to transfer the shock of motion more uniformly over the limb. It differs also in being united into a whole at its apex; but is wisely disunited by its *cleft* at its posterior portion, where it can best act on the yielding walls of the hoof. It claims likewise, as Mr. Coleman justly observes[†], importance as a natural wedge, to prevent slipping and sliding on smooth surfaces. It is reasonable also to suppose, that it forms a valuable antagonist to the downward and backward direction of the internal parts of the foot, which occur through the medium of the elasticity of the laminæ; and in this way it may offer a point of solid support to the flexor tendon during its violent extensions: and it most unquestionably acts very favourably in promoting the expansion of the hoof.

The *bars*.—We have already fully explained that the crust of the hoof does not terminate at the heels, as a superficial observation might lead one to conclude; but that having gained the heels, it turns acutely inwards, decreasing in extent, and laying itself obliquely along each side of the frog to terminate at the point. The bars, or *binders*, as they are often termed by smiths and farriers, cannot be considered, therefore, as parts exclusively belonging to the sole; on the contrary, they more immediately belong to the crust of the hoof, and are also active in keeping open the horny segment. It was essentially necessary, to destroy the effects of resistance and to lessen concussion, that the hoof should not extend around the foot; but that it should be interrupted by a chasm: it was also as necessary, to guard against contraction, that it should not end abruptly around this chasm; for this purpose each horny heel suddenly inflects inwards, and traverses the foot to its centre, thus forming each leg of the angle into a pillar of support against the contracting tendency[*]: the obliquity of the bars at the same time assisting the general intention, as the whole effect produced is favourable to the elasticity of the organ throughout.

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[*] 'The natural frog of the horse,' says Mr. Coleman, 'is placed in the centre of the sole, externally convex, and of a wedge-like form, pointed towards the toe, but expanded as it advances to the heels: in the centre of the broad part there is a fissure, or separation. The frog is connected internally with another frog, of a similar figure but different in structure. The external frog is composed of soft elastic horn, and totally insensible. The internal frog has sensation, and is much more elastic than the horny frog, and at the extremity of the heels is connected with two elastic substances, called cartilages. The toe of the sensible frog is united to the coffin bone, but more than nine-tenths of both frogs are behind the coffin bone. The toe of the sensible and horny frogs, from their connexion with the coffin bone, are fixed points, and have no motion; but the heels of the frogs being placed posterior to the coffin bone, and in contact with moveable, elastic, and not fixed or resisting substances, a very considerable lever is formed, and, whenever the horny frog comes in contact with the ground, it first ascends and then descends. The pressure of the ground also expands the horny frog, and the sensible frog expands the cartilages; and at the heels and quarters, immediately below the hair, totally governs the direction of the future growth of the crust. This ascent of the frog not only, by its wedge-like form, preserves the heels and quarters from contraction, but affords to the horse an elastic spring, and prevents the animal from slipping whenever it embraces the ground. Without any anatomical inquiry into its internal structure and union with other parts, the shape and convexity of the horny frog clearly demonstrate that it was formed to come into contact with the ground; and the more I investigate this subject, the more I am convinced that the use of the frog is to prevent the horse from slipping, to preserve the cartilages and hoof expanded, and, by its motion, to act as an elastic spring to the animal.'

[†] Mr. Coleman's view of the uses of the frog will deserve the most attentive perusal of the student, as tending to practical inferences of great importance; and although I cannot think the frog more than a valuable assistant in preventing contraction of the hoof, which sometimes commences above, beyond the limits of the action of the frog, as well as below; yet, even as a valuable assistant only, Mr. Coleman's observations, that the paring of it away, as is too frequently the case, and removing it from the natural and healthy pressure of the ground, is bad, inasmuch as it 'annihilates its functions, and ultimately, if not immediately, produces disease,' are strikingly just.

THE INTERIOR OF THE FOOT.

The first part that presents itself when the hoof is removed, is the *sensible*, or, as it is sometimes termed, the *fleshy sole* (*vid. h, fig.* 2, *h, fig.* 3, *pl.* 9), which is a vascular expansion covering a considerable portion of the under surface of the coffin bone; extending beyond its posterior part, but leaving a triangular space for the vascular expansion of the sensible frog. As the sensible sole passes behind the coffin bone it becomes thicker and more elastic, and attaches itself to the cartilages, and slightly to the navicular bone: it here also furnishes a few laminæ, to correspond with those in the heels of the horny sole: its upper surface is of a ligamentous nature, but the under is highly vascular, and from it is secreted the horny sole. The vascularity of this part renders it very susceptible of inflammation, but in different degrees[†]. The *sensible frog* (*vid. g, fig.* 2, and *fig.* 3, *pl.* 9) presents a very curious structure of ligamentous and tendinous expansions, but covered underneath by a vascular coating, corresponding in shape to the horny frog, which is secreted from it. It lies in an interval formed within the sensible sole, attached by its point to the concave inferior surface of the coffin bone, with its heels expanding posteriorly beyond that, and attached to the posterior and lower portions of the lateral cartilages; at which part they are connected with or degenerate into a lax cartilaginous substance, which, united with cellular matter, and the coverings of the skin, forms the rounded bulbs of the fleshy heels (*vid. g, fig.* 2, *d, e, fig.* 3, *pl.* 9). An inflammation of this sensible frog alters its secretion from horn into pus or matter, which finding its most ready exit between the cleft of the horny frog, is then called a *running thrush*.—The *lateral cartilages* are one to each side, indented into a groove in each lateral upper surface of the coffin bone, extending in front almost to each other, being separated only by the insertion of the extensor tendon. Independent of their bony implantation, they are also retained in their situation by means of ligamentous fibres, by lateral connexions to the ligaments of the coffin and navicular bones, and by a ligament in connexion with the flexor tendon (*pl.* 9, *g, g, fig.* 3). They are externally convex, internally concave; highest in the centre, but thinner and smaller towards the extremities: their posterior portions pass beyond the lateral processes of the coffin bone, and unite with the semi-cartilaginous substance of the sensible frog. They are partly within and partly without the hoof, and are covered at their lower portion by the coronary ligament, which, by being extended over them, prevents their too great dilatation: to their lower portion likewise the attachment of the laminæ takes place; and within the concavity formed by the extension of the cartilages beyond the coffin bone (see *fig.* 3, *pl.* 9) is lodged the ligamentous fatty substance forming the upper and posterior part of the fleshy frog. The *uses* of these cartilages, as before observed, are considerable, and divested of them the coffin bone appears but a small part, compared to the coffin that encloses it; but, increased by their attachment, the whole presents an extensive surface, equally useful as a support as though altogether bony, yet yielding and elastic. The cartilages themselves appear particularly intended to operate in expanding the upper horny portions of the hoof, as the inflected horny bars do the lower portions[‡]: they also assist in the preservation of the cavity of the coffin joint, and likewise in the formation of its articular cavity.

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[*] Most unfortunately it happens that smiths, in general, consider these inflections useless, because they cannot immediately perceive their operation, and thus almost invariably cut them out.

[†] The mischiefs resulting from pressure on the general surface of the horny sole being transmitted to the sensible sole above it, have been hinted at already; but when such pressure occurs at the heels, the inflammation is less active, from decreased vascularity in this portion of the fleshy sole; and therefore, instead of maturation, it is more usual for a deposit of blood to take place, and the product is a *corn*.

[‡] The general tendency to ossific deposit in aged horses is exemplified here in a remarkable degree: there are few of them, particularly of the draught kind, in whom they are not more or less ossified. In

The *sensible laminæ* (*vid. a, fig.* 3, *pl.* 9, also *fig.* 1, *pl.* 7).—In describing the hoof, I observed that its internal surface was lined with numerous horny lamellæ, which possessed a considerable degree of elasticity obliquely downwards and backwards, with an arrangement of their fibres corresponding to this direction, and were called the *in*sensible laminæ. The subjects of our present inquiry are, on the contrary, highly *sensible* and vascular. The whole circumference of the coffin bone, from above downwards, is covered with about five hundred of these sensible semicartilaginous leaves, each of which is received between and firmly attached to two of the elastic laminæ of the hoof, just noticed, and consequently each horny process is also received between two sensible ones. It is, therefore, evident that the surface of attachment between the hoof and the internal parts (for the coffin bone governs all the rest) must be in an extraordinary degree extensive and strong, and that they must thus form a complete *support* to the parts above. But support is only a part of their important office: they are the grand agents in that perfect elasticity of the foot which raises it from a mere solid mass to that of a case of multiplied springs. A partial observer of the foot of the horse would be led to suppose that the sole bears the superincumbent weight, apparently resting upon the coffin bone, but which is erroneous; on the contrary, we find the sensible sole can bear little *continued* pressure, though its elasticity and form enable it to bear a *momentary* one, and to descend in the efforts of the horse; being at such times only pressed on by the parts above, but which in no instance exceeds that which the elastic elongations of the laminæ allow it*. The *vessels* and *nerves* of the feet have been already described in the *Angiology* and *Neurology:* the bloodvessels are, I believe, also accurately figured in *pl.* 9, *fig.* 1.

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days of yore, from a mistaken opinion that cartilages were too inorganic to perform the ordinary processes of reproduction, it was the custom with the French school, whenever quittor attacked them, to extirpate them entirely. La Fosse was a strenuous advocate for the practice.

* That these laminæ are the means whereby the foot is sustained, appears evident from the following fact: A horse in whom both horny soles of the fore-feet had been removed, and who was remarkably given to kicking, still continued the practice, lashing out behind with both feet with great violence; yet no injury was sustained by the fore feet. From this it is clear, that had the sole been intended to sustain the superincumbent weight, the feet must have actually forced themselves through the surrounding horny circle of the hoofs. The sensible laminæ are therefore evidently the principal means whereby the internal foot is held within the outer; and further, it is through their agency that the whole possesses the greater part of its ease, elasticity, and freedom from the effects of concussion: for the foot is internally observed to be oblique from behind to before; but the weight is not oblique, but nearly perpendicular: hence it is evident there must be a constant tendency to dislocation between the parts, the coffin bone being pressed down in a direction different from that of the inner surface of the hoof; the laminæ both of the hoof and of the coffin being elastic, their joint action must allow a very considerable alteration in the position of the coffin bone obliquely downwards and backwards. Thus it would appear that, during the action of progression, the weight is first thrown perpendicularly on the pastern; from whence it is transmitted to the coffin principally, and to the navicular subordinately: but that the hard medium of these bones, and the equally hard medium of the earth, might not produce concussion and a hurtful pressure, there are these elastic laminated springs, which are so placed that both the shock and the general weight are distributed over a vast extent of surface; and that no auxiliary aid might be wanting to prevent concussion, the vaulted arch of the sole was superadded.

My contracted limits will not allow of more than a note on two subjects connected with the physiology of these organs,—their *elasticity* and their *expansibility*. So much has been written, so much dogmatism has been displayed, and so much bitter invective brought forward on the *elasticity of the foot of the horse*, that the subject excites almost as much disgust as interest. Is there any animal in existence whose locomotion is performed by pedal members whose feet are *inelastic*? Nay, is not the principle of elasticity eminently displayed throughout the whole limb, from its origin to the extremest point of its surface of opposition to the ground? Was it, therefore, in consonance with the general operations of Nature, that in forming the very noblest of her brute products she should have lost sight of a property so paramount in the rest? Would she have given to an animal at once large and heavy, but of vast power of accelerated and long-continued motion, an unyielding base, where every locomotive exertion would propagate an injurious shock through the whole machine? Elasticity was here, therefore, to be expected *à priori;* and to advocate the principle as the immediate discovery of any individual, is to slander every naturalist from the time of Aristotle to the present. We are sorry, therefore, when we observe so able a writer as Mr. Bracy Clark losing himself in grasping at the shadow, where he might insure to himself the substance. Long before Mr. Clark's publications, the *elasticity of the foot of the horse* had been specifically noticed in the writings of Mr. Freeman, Mr. Coleman, and others, as well as by myself also. To claim, therefore, the discovery of this long and well-known property, was a phantom and shadow. The substance, I apprehend to be, that Mr. Clark has elucidated it more fully and clearly than any writer before him; and, above all, that he principally directed the attention to the evils which flowed from our artificial obstruction of this principle: and here Mr Clark might have rested his claim without fear of rivalry. As already observed, an examination of the foot betrays elasticity and strength as leading features throughout its organization; and we would hope, that as the existence of elasticity as a principle is now generally acknowledged, the claim to the discovery may yield to attempts to render our acquaintance with it more and more practically useful. The *expansibility of the hoof*, though recognized

SECT. XVIII.

HYGROLOGY.

The fluid secretions of the body are mostly separated from the blood; and as most of them have already been noticed, little more than the enumeration of them will appear here.

Blood is contained in the heart, arteries, and veins; is circulatory and compounded, appearing red in the former, and purple in the latter. It contains essentially albumen, gelatin, fibrin, and water; and is not so intensely red in the horse as in the human and some quadrupeds.

Gastric juice is a limpid, colourless, mucous fluid, secreted from the villous surface of the stomach. It yields but few sensible qualities to chemical tests, but coagulates milk, and is proportionally small in quantity in the horse.

Chyle presents different appearances in different animals: in the horse it is of a milky hue; and is gained from the decomposition produced by the gastric, biliary, pancreatic, and intestinal juices acting on the chyme. Its analysis yields water, albumen, fibrin, and salts.

The *lymphatic fluids* are necessarily various, as being received from every part of the body: they are elaborated in the lymphatic glands, and eventually mixed with the chyle.

Milk is a fluid secreted in the mammæ of lactiferous animals, in some degree animalized, and partaking of the nature of chyle: it separates into cream, coagulum or curd, and serum or whey; and from its being possessed of phosphate of lime, has been supposed to be useful in the first formation of bone. The quantity secreted by the mare is proportionally small, but it is also proportionally more highly nutritious.

The *pancreatic fluid* resembles the salivary secretion, and is apparently intended for the dilution of the chyle, and probably effects some decomposition in it.

Bile is a fluid secretion of the liver; producing, in conjunction with the pancreatic fluid, a decomposition of chyle in the intestines: in the horse it is only of one kind, the pungent cystic bile being wanting in him.

Urine is a turbid yellow fluid, at times transparent, separated from the blood in the kidneys, and apparently excrementitious. Its properties partake of the nature of the food; and its quantity is relative as well to that as to the season of the year and the state of the skin. Its analysis yields various salts, acids, and an animal matter.

Mucus is a thick fluid, secreted on the surface of the membranes denominated mucous. It is of a mild, bland quality, intended to keep up due moisture in

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by most, is however yet denied by some. Mr. Morgan, a writer in the *Lancet*, of much acumen, professes to have made many experiments on the fore feet with calipers; and he asserts, as a consequence, that 'there is not an atom of difference in the *width of the foot*, whether on or off the ground; whether standing on one or both feet; or whether with twenty stone on his back or nothing.' These are strong statements, and as there appears not the least reason to doubt the perfect veracity of the experimenter, it will require further examination to endeavour to detect the error, if there be one. My own experiments have been but few, but I considered them at the time as decisive; perhaps, however, they were not sufficiently so, yet such as they were, they proved a different result. Every observation made in the imprintings of the foot in stiff clay I believe invariably proves the expansible property of the hoof; but as the expansion must necessarily be small, it will require other and very numerous processes of mensuration to clear up the point. Analogically, I think no one can doubt the existence of it in the horse, any more than that the evils resulting from shoeing him are mainly attributable to its operation being frustrated by the iron ring applied. Dilatability is so common a property in all feet, that it would be a species of scepticism to doubt it in those of the horse. We need not look further than our own feet to recognize the principle, which sensibly expand in the more solid parts even at each step; and to increase this necessary property, the foot is in many animals divided or cleft into many portions, as in the *digitigrada*. In the *ungulata* the expansibility is still preserved by some division of the foot; in the ruminants it is divided into two distinct hoofed portions. Neither in the various species of the genus equus it is lost sight of, as we have seen; for here even *solidungula* is not strictly a correct term, for the foot of the horse is also cleft to the centre, and the inflected heels of the divided portion form a crescented bow, which by the mobility of its points yielding to the downward pressure, expands the walls of the circle at each progressive motion. In fact, as we must own the foot of the horse is evidently framed for dilatability, it would be most unphilosophical to acknowledge structural capacity without functional performance.

parts; and thus to render them *apt* to the impression of *proper* irritation, as well as to preserve them from that which is improper.

Saliva is a fluid intended to dilute the food; to assist digestion; to keep the alimentary canal moist, and *apt* to gustatory impression. Its analysis yields phosphates, muriates, albumen, and mucilage.

The *lachrymal secretion.*—This does not materially differ from saliva, and is secreted by the lachrymal gland, to moisten the eye, and keep it transparent.—*Semen* is secreted from the blood in the testes. It contains mucilage, phosphate and muriate of soda, and phosphate of lime; but no light is thrown upon its ultimate ends by any analyzation of it. The microscope detects animalculæ in it.—*Synovia* is an animal mucilage, secreted by the inner membrane of the joints, to prevent attrition.—*Interstitial fluid* is a serous secretion poured out into all the cavities, to prevent friction and an improper union of parts.—*Fat* is a condensed inflammable juice, spread over almost the whole body, secreted within the cells of the adipose membrane by the arteries ramifying on their inner surface: it is of various consistencies in the different parts, and in different animals; forming grease in the horse, tallow in sheep and oxen, lard in the hog, and train oil and spermaceti in fish: it is not miscible in water, and, like oil, it forms soap with alkalies. It is a protection to parts, and a depôt for occasional inanition.—*Sweat* is an excrementitious fluid; in some horses of a strong smell, particularly when feeding on grass: its properties differ little from those of urine; and where one is formed in great quantities, the other is usually lessened.

PART THE THIRD.

THE

PRACTICE OF VETERINARY MEDICINE;

OR,

A DESCRIPTION

OF THE

CAUSES, SYMPTOMS, AND MEDICAL TREATMENT

OF THE

DISEASES OF THE HORSE;

To which is added,

A MORE CONCISE ACCOUNT

OF THOSE OF

NEAT CATTLE AND SHEEP.

OF DISEASE GENERALLY.

Disease is a morbid affection of a part or of the whole of the body, whereby the exercise of some of its functions is altered or suspended. The *causes* of disease are various; some of them are evident, others are obscure. We name these causes *remote*, or such as *predispose* a part or the whole of the body to take on disease: thus peculiarity of conformation predisposes to morbid attack; as small carcassed horses are prone to constitutional diarrhœa, and dark chestnut horses to contracted feet. By encouraging a particular conformation, hereditary aptitudes to certain diseases of body and defects in temper are often entailed. Thus some breeds are particularly subjected to catarrh, as others are prone to broken wind. There are also *proximate*, *exciting*, and *occasional* causes constantly acting in the production of disease; thus a horse, violently heated during hunting, plunges into a river, and inflammation of the lungs follows. A nipping wind, with sleet, blows on cattle purposely fed high for sale; they take a cold, for they had been hitherto not exposed to so frigid a temperature. Cold supervening on heat is here the occasional, the exciting, and, in fact, the proximate cause of the affection. Diseases for many centuries were principally attributed to an affection of the fluids or humours of the body, and this theory was termed the *humoral pathology*. Gradually, however, as anatomy and physiology shed their powerful lights over the subject, the solids of the body also were found capable of becoming primarily affected, and more particularly the vascular system. It was first taught that fever originated in the viscosity of the blood, whereby its passage through the small vessels was obstructed. Others assumed that it is to a spasm of the extreme arteries that the fancied obstruction of the blood was attributable. Diseases of an inflammatory nature vary in appearance according to the part attacked: thus phrenitis is the consequence of morbid vascular action of the brain, and enteritis on the substance of the intestines; but phrenitis and enteritis are diseases very dissimilar in their symptoms. Each disease also, though it affords some characters in common, yet is liable to individual peculiarities dependent on the immediate state, age, temperament, and situation of the object attacked. We conceive it wrong to consider domestication as the sole agent in the production of disease. Epidemics are known to thin the herds of wild horses. Nevertheless, artificial culture does certainly beget a disposition or liability to sickness, greater than that attendant on a more natural life.

The *systematic division of diseases* is termed *nosology*, the simplest arrangement of which is the alphabetical[*]. Anciently, diseases were divided according to their duration, and this laid the foundation for the *acute* and the *chronic;* but which subjected the founders to call in the aid of the *subacute*, for those which ranged in the intermediate spaces. It has also been attempted to arrange diseases simply according to the parts of the animal frame, which suits well with the plan of uniting the anatomical, physiological, and pathological considerations together[†]. Modern nosology is framed as well on the distinctive symptoms of diseases, as on doctrines drawn from an observance of the morbid actions of the vascular, nervous, and lymphatic systems. Linneus, Sauvages, and Cullen, raised stupendous nosological monuments, the bases of which still serve for foundations for modern superstructures. In England, one of the earliest systematic arrangements of the diseases of the horse was that which appeared in the Veterinary Outlines. Mr. Percivall's "Hippo-pathology," which followed, has hitherto found no competitor in point of excellence.

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[*] In human pathology, Dr. Heberden's excellent nosology, founded on this plan, forms a prominent instance.

[†] The Lectures of Mr. Percivall afford an excellent illustration of this method of teaching the veterinary art. Among our continental neighbours, nosological arrangements abound. Bourgelat, M. Vitet, La Fosse, &c. arranged the diseases of the horse, after various methods, into systems. Later professors have worked in the same field, and one of the last productions of this kind is the Esquisse de Nosographie Vétérinaire of M. Huzard, jun., which is a work of great merit.

The division of diseases into epidemic, endemic, sporadic, and specific, is still acknowledged by many good practitioners. *Epidemic diseases* are such as prevail generally at a particular time among all ages and kinds of our domestic breeds of animals, of which that one so common of late among cows is an instance, as the foot lameness which attacks our sheep is also another. *Endemic diseases* are those which confine their attacks to a certain locality, as the malignant epidemic of horned cattle is principally a continental complaint: altogether, however, endemic diseases are not very frequent in brute subjects. *Sporadic diseases* stand in opposition to the two former, and form a very extensive class, comprehending all such as are confined to particular subjects, and affect particular constitutions or ages: thus strangles becomes a sporadic disease to *young* horses; and the distemper a sporadic disease among *young* dogs. *Specific diseases* are such as are peculiar to a particular class of animals: thus farcy, glanders, and strangles, are among the specific diseases of the horse, as distemper, popularly so called, is one peculiar to dogs. Horned cattle, swine, &c. have also their besetting maladies.

To a proper knowledge of the management of diseases we consider the cause, symptoms, diagnosis, prognosis, and cure. The *cause* is frequently involved in obscurity; at others a moderate portion of attention will discover it; while in some instances it is evident at once. The *symptoms* of a disease are the *immediate* effects it produces; thus an inflamed brain, being productive of delirium and redness at the eyes, makes delirium and redness at the eyes a symptom of inflamed brain: but this does not take in any other than the immediate effect; for death is frequently a result of this disease, but death is not a symptom of an inflamed brain. From the symptoms we form our *diagnostic* of the disease, that is, we judge of its present state; being masters of which, we are enabled to form a *prognosis*, or opinion of its probable termination. The *cure* forms the most important part, and frequently consists in attempts to assist Nature in her efforts to produce a natural remission of the disease. If these efforts are wanting, or inert, we promote an artificial one, or we attempt to resist the effects of the disease throughout its progress.

CLASS I.

FEBRILE DISEASES IN QUADRUPEDS.

OF PURE FEVER.

UNFORTUNATELY it is not yet a settled opinion among veterinarians, whether *pure fever*, as a distinct disease, is found in quadrupeds. Mr. Coleman altogether denied its existence in horses. Mr. Percivall on the contrary, backed by a vast body of veterinarians of repute, acknowledges that horses and other quadrupeds are the subjects on many occasions of *simple fever;* and whoever will turn to his admired work, entitled "Hippo-pathology," p. 142, will there see the subject of fever very ably treated on, and with ourselves, and numerous others, be led to acknowledge its idiopathic character. We propose this reference, because our own limits will not allow us to transcribe them. Nevertheless, candour obliges us to allow that very able supporters of the non-existence of such an affection as pure fever in the horse, Dr. Clutterbuck, Professor Marcus, and others, were impressed with a similar opinion as regards man; but we long since dissented therefrom, being, by observation, constrained to admit that we very frequently witness inflammatory affections exhibiting all the phenomena of febrile action, without topical affections of any important organs, thus leaving us unable to point out any definitive marks by which we can characterize true or simple fever. Boerhaave, the great medical luminary at the University of Leyden, says, 'In every fever, arising from internal causes, there is always a *shivering*, a *quick pulse*, and *heat;*' but adds, that 'the quick pulse *alone* is frequent through its whole course, from the beginning to the end, and *by that only* the physician judges of the existence of fever.' We are ourselves taxed with having stated it as our opinion, that *pure* or *primary* fever is of rare occurrence; and we acknowledge that until we had watched very many fevered horses, we had our doubts on the point: but an extended field of inquiry, and a close examination of many simple febrile cases, in which no local malady could be detected either by ourselves or others, forced on us the conviction that *idiopathic* fever was not unknown in the horse. We can also affirm, from our own experience, that so long as it continues not to be mixed with other affections, it is very manageable. The horse appears first in a state of dejection, and sweats on every exertion, however trivial. His extremities, in all probability, are cold at the onset, and not unfrequently he shivers universally. As soon as a remission of the cold fit takes place, general heat succeeds; the pulse, before slow, and its stroke debile, becomes quick and at length throbbing. Breathing is quickened, and the dejected animal looks around as though he implored relief, yet is watchful and sleepless, alternately sweating and shivering. His thirst is in most cases urgent, but his appetite is diminished. He stales little, his urine is high-coloured, and the dung he voids is hard and in small balls. We have occasionally seen a sudden change both in urine and dung balls, which usually bespoke either a metastasis to some individual organ, or the disturbance in the system lessened, and health gradually returned. A correspondent in *The Veterinarian*, who signs himself P., observes, 'The incipient dejection, and the cold fit, require close, early, and accustomed observation to detect. The practitioner, not called in (if at all) until long after it has ceased to exist, declares "he witnessed no cold or shivering fit:" how should he? The groom is the only *probable* person to have noticed the occurrence; and it is by no means *improbable* that he, through heedlessness or ignorance, or both, has overlooked it. Be it added, however, that a cold fit is *not* invariably present; nor is it essential to constitute fever. The disturbed breathing in idiopathic fever never amounts to or at all resembles the hurried, laborious, and painful heaving of the flanks, characteristic of inflammation of the lungs: in symptomatic fever, poignant, agonizing pain will, however, occasion equally distressing heaves of the flanks; but then, in the latter case, the animal breaks out into a profuse sweat, and must be promptly relieved, or he dies. Faintness, occasioned from loss of blood, will produce similar symptoms. I make these latter remarks in reply to those who would fain persuade me that I could not distinguish between a *fever* and a *pneumonia*.'

We will, therefore, content ourselves with a supposition that we have established the existence of idiopathic or pure fever in the horse; and that it is in medical nosology very nearly allied to *synocha*, which, it is well known, bears the leading characters of an inflammatory affection, and is to be treated by early but mild depleting, both by bleeding and purging, followed up by such sedatives as will keep down the excess of arterial action, be it in horses, cows, sheep, goats, deer, swine, dogs, &c.; and, farther, whether we choose to consider of our patients that they are attacked with *pure fever*, or a *general inflammatory diathesis*, will matter but little, so that our treatment is calculated to lessen the arterial action, and to renovate the organs that have suffered in the attack. We will now proceed to a subject of no less importance to the welfare of the horse than that we have just quitted, only premising that the treatment of Diffused or General Inflammation, when, by metastasis, it quits its early seat and fixes on some other part, that be it understood, under such circumstances, the accompanying fever becomes *symptomatic*, of which we shall have to treat hereafter.

DIFFUSED OR GENERAL INFLAMMATION IN HORSES, &c.

Inflammation is a subject of the greatest possible importance, whether we regard its noxious or its salutary effects; or as an active and necessary agent in the restoration of some parts, or in the injuring or destruction of others. It may be considered under the divisions of *general* or *diffused;* as when the whole vascular system participates primarily in the affection. Or it may be *local* or *confined;* the bloodvessels of an individual part only being affected with the inflammatory action. To the first of these we refer febrile affections and extensive inflammations of vital organs, as well as symptomatic fever generally, all which more immediately concern our present pathological purpose. Local inflammation will be more fully considered with our surgical detail, and the structural derangements of the more external parts: but as the leading features of this important subject belong to both departments, we shall commence with a summary of the whole, reserving the practical illustrations of local inflammation to hereafter.

Inflammation may be regarded as a disease of the bloodvessels[*], principally of the arterial ones; and thus in proportion as a part is more or less vascular, so it is more or less prone to active inflammation[†]. Inflammation is characterised by heat, redness, tension, and pain. The temperature of an inflamed part will be found in every instance increased, but not in a degree proportioned to the intensity of the inflammatory action[‡]. In the horse and other quadrupeds we cannot so readily detect the heightened colour of inflamed parts, from their exterior hairy covering; but when this is shaved off, it is sufficiently evident, and in certain parts, as the conjunctive membrane of the eye, and the mucous lining of the nostrils and mouth, it is most easily observed. This effect we know to be occasioned by more red particles being circulated than natural in such parts as usually carry red blood, and by red globules being forced into such vessels during the inflammatory state as at other times carried only the colourless parts of the blood, as the transparent part of the eye, which under inflammation is therefore often seen bloodshot. The swelling of an inflamed part is effected at first by this increase to the capacity and distention of its vessels; afterwards it may be kept up or even enlarged by effusion of the contents of the vessels within it[§]. The sensibility of an inflamed part is always increased, but not uniformly in proportion to the degree of its vascularity; but it appears more generally dependent on the supply of nervous influence.

The divisions of inflammation are numerous, some of which are useful and appear natural, as into *acute* and *chronic*. Very vascular parts are subject to the former, which is commonly more quick in its progress and more favourable in its termination than in parts less vascular, as bones, ligaments, and tendons, in which the chronic or slow is apt to occur. This leads to a further division into the *healthy* and *unhealthy* inflammation. When a wound is inflicted into a muscular part, heat, swelling, and effusion quickly take place; the results of which are either immediate union, or granulations, which finally restore the parts; such is healthy inflammation. Tumours in other parts less organized, or under unfavourable circumstances, submit to many diseased changes of unhealthy inflammation. Inflammations are also called *common*, when only the ordinary processes go on; and *specific*, when the common phenomena are not observable, but are superseded by others, as in rheumatism, rabies, &c. &c. It has also been attempted to divide inflammation according to its seat in elementary tissues[*]; from our observation that a difference in structure has a great effect, not only on the particular and general inflammatory phenomena, but also on their future effects and terminations. A still more general and characteristic division of inflammation is into *phlegmonous*, or the inflammatory affection of the skin and membranous parts, accompanied with heat, distention, redness, and an inclination to effusion when deep-seated or extensive; to suppuration when more superficial and circumscribed. And into the *erysipelatous*, which is seldom accompanied with much tension, is not uniformly red, is early attended with serous effusion in the form of small blisterings and future desquamation, but which is a state by no means well defined in the horse; nor is it much more distinct in cattle, but is more so in the dog.

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[*] It has been before stated, that inflammation was formerly under the humoral pathology considered as dependent on a diseased state of the blood itself; but the impossibility of giving a rational explanation of the causes which produced it, or the phenomena which accompanied it, by any change in the blood itself, led physiologists to investigate the effects likely to be produced by an altered state of the bloodvessels, and considering the blood itself to be unaltered. Upon this consideration of the subject the theory of inflammation is now formed; and as it is a most important subject to the veterinarian, and one on which the practice of his art must mainly hinge, he would do well to inform himself of the experiments made, the facts collected, and the reasonings deduced in support of the present doctrines, from the able works of accredited writers on human and brute pathology, both of the English and continental schools.

[†] In this way a stimulus applied to a part, as heat, friction, acrid matters, &c. increases the florid tinge, by determining more blood to the part. Greatly increased redness in the inflamed part is not, however, often met with in veterinary practice. The sensibility of the organ is commonly augmented, and its temperature is raised: and if it proceed farther its bulk is likewise enlarged, producing all the phenomena of increased vital powers. M. Latta has however taught, and others have adopted the same opinion, that an inflamed part is not to be considered as possessing increased vitality or strength; but that, on the contrary, it is in a state of increased and acquired debility. It is not, however, probable that such is the immediate consequence: but it is more than probable that, after some continuance of the inflammatory state, the action is carried beyond the powers of the vessels of the part, and that they become weakened in proportion as their contractility is exerted to overcome their distention. According to Dr. Thomson, the velocity of the blood in inflamed capillaries sometimes continues from the commencement to the termination of that state; and that at others a diminished velocity in the circulation marks the rise, the progress, and the close of the inflammation; but that this latter state is much more common during the progress of the affection than during its first stages. (See *Thomson on Inflammation.*) Dr. Wilson Phillip says, 'In short, inflammation seems to consist in the *debility* of the capillaries, followed by an increased action of the larger arteries.' (See *Dr. Phillip on the Vital Functions.*) It will thus be seen that the experiments made by Dr. Thomson and Dr. Phillip, to determine the contended point of increased or diminished strength in the capillaries, led to different results and conclusions, and that, unfortunately for the medical art, we are still somewhat in the dark on this interesting point: but, as before stated, we are authorised from the best conducted experiments, as well as from the evidence of observation on the phenomena which occur, in concluding with Dr. Thomson, that under some circumstances the capillaries are in a state of increased action, and at others are affected with actual debility in inflammation.

[‡] Mr. Hunter denied any increase of temperature to an inflamed part, but the experience of every day demonstrates the contrary. From the time of Celsus, this has been universally admitted: 'Notæ vero inflammationis sunt quatuor, rubor, et tumor, cum *calore* et dolore.'—*Cels. lib.* 3, *chap*. 10. The supporters of Mr. Hunter's assertion attribute the *sensation* to an increased sensibility of the nerves, which convey false impressions to the sensorium. It is sufficient, however, to apply a thermometer to an inflamed surface to prove the fact. (See *Mr. Percivall's Hippo-pathology*, p. 53, 54.)

[§] The water farey of horses subjected to violent general inflammatory action is an instance of this, where the vessels pour out a serous fluid, which lodging in the interstices of the cellular membrane, occasions that dropsical pitting-in of the skin which is observable in such cases.

When the usual phenomena of inflammation have lasted a longer or shorter time, according to their intensity, the parts they affect, or the age, constitution, and condition of the horse, another series of symptoms present themselves, and the inflammation terminates. These ordinary effects or terminations of inflammation, are resolution, adhesion, suppuration, ulceration, and gangrene. *Resolution* occurs when the overcharged and distended vessels not having been excited either into effusion or suppuration, recover their proper caliber, leaving the texture and former state of the parts entire. To effect this termination the efforts of the veterinarian ought to be principally directed; and it will stimulate his efforts to know that a complete resolution may take place in whatever part of the body the affection is situated. *Adhesion*, or the adhesive state of inflammation, appears to be dependent on a disposition of the capillary arterial branches to pour out the coagulable parts of the blood; or, in other words, what has been known by the coagulable lymph, and which process may be healthy or diseased, according to circumstances. (See *Local Inflammation.*)

When the continuance of the inflammatory action prevents either of these effects, the general affection of the system becomes increased; the pain, which probably before was dull, becomes now darting and severe: and *suppuration* follows. These appearances are principally observed when tumour forms, and the pus or matter is poured into a circumscribed cavity. When suppuration takes place on extensive mucous surfaces, the usual symptoms of great vascular action are less, and the pus seems to be poured forth from the arteries with little or no abrasion or ulceration of substance. *Gangrene* occurs when the arterial action has been so extreme as actually to produce death in the inflamed vessels by a derangement and breaking up of general tissues. Blood is occasionally extravasated; but more frequently an excess of irritation consequent on the violence of the inflammatory stage destroys the animal[†].

In addition to the foregoing terminations, there is another that now and then takes place naturally; at other times it is brought about artificially. Two distinct inflammations are seldom found in parts situated near to each other; but a part in proximity may become susceptible of the increased action in a superior degree to the part first affected; in which case, as the latter takes on the inflammation, it very generally produces the effect of removing it from the former; and this termination is called *metastasis*. See the following. *Hippo-pathology*, vol. i, p. 62; *Veterinarian*, vol. ii, p. 15 and p. 185. Mr. Castley also, on the same subject, should not be overlooked; *Vet.* iii, p. 159. Many other useful hints thereon may be gained from this valuable periodical. Nevertheless, from the horse being little liable to erysipelatous and arthritic inflammations, in which this anomaly is most observed, it was, therefore, presumed it was rare. A more extended field of observation has, however, shewn that it is not so; on the contrary, many instances of æquine metastasis of inflammation occur, as from the lungs, &c. to the feet, and occasionally from the feet to other organs. Ophthalmia also is frequently relieved by metastasis; and it has been likewise brought on by relieving other organs of their inflammatory burthen (see *Veterinarian*, vol. iii, p. 159) An *artificial metastasis* is indeed one of our most active auxiliaries in combatting inflammation: and thus we inflame the skin or other less important parts by stimulants, to promote a translation of the morbid vascular action going on in some essential organ. The termination of inflammation by indolent tumour is sufficiently common in the horse; but it is very seldom that such enlargements present any *scirrhous* or *steatomatous* characters.

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[*] This method of division is sanctioned by the names of Dr. C. Smith, Bichat, and Pinel.—See also observations on the different species of inflammation, by Mr. James, of Exeter, 1821.

[†] Mr. Percivall with great truth observes, that gangrene as it exists in the human subject is not often present in the horse; but this does not arise because his system is incapable of it. I have seen sphacelated lungs, liver, kidneys, and bowels; but though these cases are rare, because, as he justly remarks, the general powers usually fail before the morbid organ arrives at this state, yet they do occur.

The liability to these various effects or terminations of inflammation, it has already been stated, is not the same in all parts of the body; on the contrary, some are more prone to one, and others to a different one. Deep-seated parts, and the great serous cavities of the body, appear peculiarly liable either to the adhesive effects of inflammation, or to that modification of it which produces effusion. By the former, bands of coagulable lymph form adhesions in the chest and disturb the respiration, or obstruct the trachea and produce roaring: by the latter, serous effusion takes place and produces dropsy. In mucous canals and on mucous surfaces, on the contrary, suppuration most readily occurs; and, as in parts supplied only with exhalent capillaries, ulceration and an abraded surface must accompany the formation of pus, as already noticed; it is here produced as a pure secretion from the surface without ulceration, dependent on structural peculiarity. It is to this cause we attribute the tendency of the nasal membrane to produce pus in catarrh, strangles, and glanders, but very rarely to take on gangrene. If bone become injured, its inflammatory process is ulcerative, but slow, and granulations form very tardily; for its structure is but little vascular, compared with skin or muscle, which being torn off, inflames, granulates, and is reproduced quickly.

The *causes* of inflammation are said to be remote and proximate, but which distinctions are by no means easy to define. Such occasional causes as act by their outward effects as stimulants, whether they act chemically or mechanically, we can readily comprehend: but the more remote agencies of heat, cold, miasma, and deleterious gases, we are at a loss to explain, and they may be proximate or remote causes according to circumstances. Inflammations, local and confined, and febrile affections generally, were wont to be attributed principally to the effect of cold. Modern pathologists have been led to consider this as erroneous, and, on the contrary, they attribute more inflammatory affections to the alternation of heat with cold, than of cold with heat. But it is probable that, in attempting to prove too much, as is usually the case, they prove too little; for daily observation of plain facts convince us that the application of cold, under various forms and circumstances, is an active agent in the production both of general and of local inflammation*. The proximate cause of inflammation, as already stated, is defined to be the state of the vessels, and of the relations between them and the circulating blood within them†.

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* On this subject Dr. Thomson most ingeniously remarks, that 'No subject is more deserving of attention, than the effects which are produced in the human body by the operation of cold applied to its surface; but the subject is at the same time exceedingly extensive, complicated and difficult. These effects differ according to the degree in which the cold is applied, the state of the system, the part of the body to which it is applied, and the mode of its application. So diversified, indeed, are these effects, that it requires no mean confidence in theoretical reasoning to believe, that the operation of cold in producing them is explicable upon any single general principle.' (*Lectures on Inflammation*, p. 58.)

† Here an evident difficulty occurs: If the state of the vessels be an inflammatory one, Is inflammation a cause or an effect of this state? If it be a cause, it cannot be more proximate than that which promoted it, whether cold or other; if it be an effect, no cause need be assigned to it.

In inflammation, either some change actually takes place in the blood itself, or it becomes altered by the vessels themselves, for its disposition to coagulate is retarded and its fluidity is apparently augmented, by which means the red globules fall to the bottom of the blood drawn, and the gluten or coagulable lymph, called the buff, appears on the top: and thus, when blood drawn exhibits a white surface and sizy consistence, it has been usual to say, there is an inflammatory state in that habit. (See *Pulse*, p. 133, 134; see also *Nature and Properties of the Blood*, p. 204.) In local inflammation the vessels of the affected part only are in this state, unless such part be of great magnitude or importance in the system; in which case general inflammation sometimes accompanies it, and this state is called symptomatic fever. *General inflammation* produces inflammatory fever: nevertheless, there appear states or circumstances in fever which are not dependent on increased action alone, and it is this *something* that forms the very great obscurity in our theory of fever, and which is, in fact, the very essence of the disease. That increase of vascular action which accompanies fever should be distinguished from simple increased action arising from the affection of particular parts: the former constitutes a disease; but the latter is merely *symptomatic*, and sometimes even a salutary effort: it may, however, in some cases, rise to such a height as to wear out the patient. Most extensive inflammatory actions in the horse proceed to their termination sooner than those of the human, which is thought to arise from the greater quantity of muscular coat found in his arteries, but is probably equally dependent on the vast *quantity* of blood in the system. This rapidity gives a peculiar character to inflammatory diseases in him, and renders it dangerous to form either a diagnosis or prognosis on the doctrine of similar affections in the human. The *prognosis*, or the being able to give an opinion as to the probable effects or terminations of extensive inflammation, must be formed from an attentive observation of the foregoing circumstances; and such attention must of itself form the *diagnosis*. In the *resolution* of inflammation not only the affected parts return to their former state; but the system at large becomes less irritable, the vascular action moderates, and the arterial beat softens. If the attack has been purely local, and not excessive, it is sufficient that the sensibility of the affected part, the redness and the tension, gradually subside. *Effusion* is indicated by a remission of the increased action, the pulse usually becomes smaller; but if the effused fluid be considerable, the pulse may be observed to be likewise irregular: there is also frequently an obstruction to the functions of some of the organs in the neighbourhood of the effusion. When suppuration takes place, the symptoms of pain and irritation cease, the pulse becomes sensibly softer, and fluctuation soon follows. When that breaking up of vascular texture and debasement of the blood takes place, which characterises the gangrenous tendency in the horse, there is a mitigation of pain, and the pulse becomes softer; but it likewise becomes weaker and weaker, until death closes the scene.

The treatment of general or diffused inflammation.—In attempting the reduction of diffused inflammation, whether existing in the specific form of inflammatory fever, or in that of the idiopathic inflammation of some vital and important organ, the first remedy usually employed is *bleeding*, because of all other remedies this tends most to lessen the morbid increase of circulation going on. In general inflammation it is prudent to abstract a large quantity of blood at once, and as quickly as possible, by making a large orifice, for reasons detailed in page 205: and if the state of the pulse and other appearances (see *Pulse, and cautions relating to Bleeding*, p. 133), as those of the blood drawn, &c.* betoken a continuance of the undue arterial action, repeat the bleeding as long as the muscular strength continues unimpaired; and this more particularly if the horse be of due age, and in full condition; ever keeping in mind that one or two early and copious bleedings are more effectual in combating active inflammations, than numerous subsequent abstractions, which frequently weaken and impair the general strength, and thus often add to the disease. The practitioner must not, however, be betrayed into too indiscriminate a use of the lancet, in some specific affections of an inflammatory nature. The peritoneal inflammation of the bowels will bear repeated bleedings; but that which affects the villous surface must be repeated with caution. One bleeding is frequently useful in the early stages of catarrh, but more is seldom admissible: while the inflammatory attacks on the parenchyma of the lungs will bear numerous venæsections. When phlegmonous tumours are forming, and in strangles also, *unless the symptomatic fever is great*, bleeding must be cautiously attempted. *Purgatives*, in the human subject, form the next active agent in combating arterial excitement; but there are some peculiarities in the structure and functions of the horse, which render this less eligible than in man. To produce active purgation in the horse is a source of great irritation frequently, and one that calls forth more of the powers of the constitution than under some circumstances can be spared. (See *Purgation*.) It also requires so much time to effect it, that our dependence on it is lessened. Nevertheless, we must not neglect attempting a soluble state of the bowels by such means as tend the least to irritate them. In some cases, repeated small doses of aloes, or a watery solution of them (see *Veterinary Materia Medica*), may be properly substituted; in others, neutral salts, &c. and in all bran mashes and warm water are means within our power to further the end, without any danger of irritation. Occasionally cases occur which require a more active purgatory practice by the croton tiglium, or a full dose of aloes at once. *Diaphoretic* and *nauseating remedies* are among the principal means available to the great end of combatting vascular action. Antimonials given in sufficient doses, and repeated at proper intervals, have unquestionably a considerable power over the arterial system; and this without operating very sensibly, either in nauseating the stomach, or greatly relaxing the skin; but apparently by a direct action on the heart and arteries, as soon as received into the circulation[*]. If the antimonial powder be used, it should be given as a ball twice a-day, in two-drachm doses. If the tartrate of antimony be employed, it may be in doses of a drachm and a half three times a day, dissolved in water, gruel, or other liquid. In diffused inflammation, accompanied with great prostration of strength, a good arterial sedative will be found in the acetate of ammonia, and a still better one in the acetated liquor of ammonia. (See *Vet. Mat. Med.*) Nauseating remedies are certainly available in the horse, in lessening arterial action, and the pulse will be found to lessen under the action of all such agents as tend to produce this sensation in the stomach. But this effect so much under our command in the human system, and in most quadrupeds also, is not, from structural peculiarity, so readily nor so eligibly exerted in the horse. It is true he may be nauseated; and during the effect, when confined within certain limits, the circulation will be diminished and the skin relaxed; but when the nausea is pushed into unavailing efforts to vomit, great irritation follows, and the pulse increases in frequency, often becoming intensely hard, and sometimes irregular also. Under such circumstances, I have seen profuse perspiration, which, in every instance, has left the animal greatly prostrated in strength. When, however, a nauseating effect is found to be readily excited, without producing extreme distress (and these aptitudes are very different in different subjects), it may be advantageously brought in aid of the other means of attacking inflammation. The articles which may be employed for this purpose are various: when purgation is required as one of the intentions of lowering arterial action, two drachms of aloes, given every sixth hour until eight drachms have been given, will often conveniently fulfil both intentions of nauseating and purging. In the same way I have employed, with great advantage, the sulphate of magnesia (Epsom salts), in doses of four or five ounces, every three or four hours, largely diluted, and this particularly where an irritable state of the bowels has forbidden the administration of aloes or other powerful cathartics. Active nauseants will be found among henbane (hyoscyamus), nightshade (belladonna), wolfsbane (aconitum), tobacco (nicotiana), and the root of white hellebore (veratri album). Each of these will produce nausea, in repeated doses of fifteen to thirty grains, but they all require much watching (See *Nauseants*, *Vet. Mat. Med.*). The white hellebore root, powdered, is employed for this purpose by many veterinarians, and it is now much used by veterinarians, whose accounts, however, vary with regard to it. It still continues, I believe, to find a warm advocate in Mr. Percivall, who recommends it in doses of twenty grains, twice or thrice a-day, and even considers it as the only diaphoretic with which we are yet acquainted. *Diuretics* are also serviceable in allaying inflammatory action, under the cautions detailed in that article. *Diluents* are likewise assistant febrifuges; as tepid water, hay or bran tea, thin guel, &c. &c. in considerable quantities, by promoting gentle diaphoresis and a soluble state of the bowels. As heat is known to increase arterial action, so a *cool temperature* is generally advisable in these cases, with a thorough access of fresh air. All exercise should be avoided except such as the horse is inclined to take himself in a loose box: strong muscular action greatly increases the circulation. Stimulating articles, as spices, ale, &c. should be avoided, unless indicated by peculiar circumstances. As regards clothing, circumstances must direct the quantity: some slight guard to the skin, which is now more than usually sensitive to the actual contact of cold air, is proper, except the weather be very hot and the stable or box close; but woollen or other hot coverings assist to keep up vascular action. In this way it should be the aim to avoid likewise all other general and local causes of irritation. These form the more general indications of cure of diffused inflammation, in the form of general fever, and in that of internal and essential organs; and we shall now proceed to speak of the several kinds separately.

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* It is not the buffy state of the blood drawn, neither is it the cupped appearance of the coagulum, from which criteria of the propriety of a repetition of the bleeding only can be drawn; but also from the adhesiveness and tenacity of the coagulum as a mass. However buffy the blood may remain, provided the coagulum be soft and easily broken, a continuance of bleeding will not be advisable. See *Nature and Properties of the Blood*, p. 204.

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[*] I am fully aware that I am combatting the opinions of some of our best veterinarians, by recommending antimonials as active agents in lessening arterial action; but repeated direct experiments, united to twenty-five years' attentive observation, have convinced me of the fact; and I am borne out in the recommendation by the opinion also of many other ingenious and eminent veterinary practitioners, in whose practice antimonials become a powerful antifebrifuge remedy. (See *Professor Peal's excellent Work*, p. 83; *and Clarke's Vet. Phar.* p. 28). With Mr. Youatt also, whose observant habits and acuteness of perception are well known, it continues, I believe, a favourite febrifuge.

EPIDEMIC CATARRHAL FEVER IN HORSES.

I purposely commence with this fever as being one of the most frequent which attacks horses, either from the inhaling of some *miasm;* or otherwise from being exposed to a very variable temperature when labouring under the effects of fatigue, and probably of privation also; which, be it observed, has a more injurious effect on horses than is generally imagined, particularly on young ones, and more so in a variable spring, when heat and cold, drought and moisture quickly alternate. It sometimes is prolonged through the summer, and into the autumn also, when the predisposing causes are continued. It is a true epidemic, and, as I believe, makes its attack under a peculiar or specific influence, and is not infrequently accompanied with the leading features of asthenic bronchitis.

The *distemper* or *influenza*, as it is sometimes called, is singularly prevalent in some seasons, and rages more under some circumstances than others; and although it exhibits general characters in common, yet the epidemic of one year will be marked with some particular symptoms in most of those it attacks, which will not appear in the epidemic of the next. Horses of large cities and crowded towns are more obnoxious to it than those of the country; and than those less confined. Occasionally, however, although the liability to its attack is almost universal among all varieties, yet the young, and such as have been lately brought under stable management, are in general observed to be more liable to it than the older and worked horses. The spring months appear particularly favourable to its production, and the prevalence, as already observed, is materially increased by a variable state of the atmosphere, as great and sudden changes from dry to wet, and from heat to cold, and still more certainly if accompanied with a long-continued easterly wind. Now and then it is found to occur in wet autumns also. It has been disputed, whether it be contagious or not, and both the negative and affirmative may be maintained. In some seasons it exhibits little or no contagious characters; in others it is highly so, particularly among young horses[*].

It is of great consequence to distinguish this complaint from pneumonia or simple inflammation of the lungs; for, if bleeding and other parts of the depleting system, which are essentially necessary in pneumonia, be carried too far in this, the consequences are pernicious. To an attentive observer such a mistake is not, however, likely to happen; the early defluxion from the nose, and its tendency to become purulent; the tenderness and swelling of the submaxillary glands with the early prostration of strength which accompanies it, compared with the violence of the other febrile symptoms, all sufficiently characterize catarrh; the pulse in this is that of irritative fever, and although often small and frequent, yet it has not often the wiry, oppressed, and indistinct feel usual in pneumonia.

Catarrhal symptoms[†].—The disease usually commences with a rigor, or shivering fit, but which is frequently not observed; to this succeeds increased heat, with hurried respiration; a defluxion from one or both nostrils, which become quickly heightened in colour, the defluxion therefrom being at first of a thin and serous nature; the eyes appearing at the same time heavy, red, and moist. The serous exudation from the linings of the nose, however, soon loses its thin, watery character, and becomes mixed with flaky coagula from the Schneiderian membrane; and if an early resolution of the inflammation does not take place, cough comes on, the suppurative process next succeeds, and the discharge becomes purulent. The general tendency in mucous surfaces in continuity, and even in contiguity, to become similarly affected, extends the inflammation into the pharynx and larynx, from which the tonsils frequently become tumefied and tender. Sore throat is therefore a very frequent accompaniment to the complaint, which shews itself by a difficulty in swallowing water, which is rather sucked than gulped. The hay taken also is chewed, or '*quidded*,' as it is termed, and then thrown out of the mouth. The inflammation extending itself throughout the larynx makes cough a usual system also, and which is more harsh, dry, and frequent, as the inflammation passes the rima glottis and enters the trachea, or less so when it confines itself to the larynx alone. From the tumefaction about the rima glottis, the cough is often almost incessant, as well as deep and sonorous, and is frequently so painful as to occasion much impatience and violent stamping in the horse during his efforts. When the inflammation extends itself into the bronchial passages, pneumonic symptoms, as oppressed pulse, and intensely red nasal linings, are added to the catarrhal affection. In its progress throughout the extent of Schneider's membrane it often affects the frontal sinuses, in which case the head is pendant, the eyelids are nearly closed, and even slight appearances of coma present themselves. The general affection makes it very common for the maxillary glands to become much tumefied, extremely tender, and sometimes to suppurate, and not unfrequently the parotids also are affected. The same tendency likewise produces phlegmonous tumours in various parts of the head, which greatly protract the disease. In some instances also swellings appear on the chest, belly, or legs, but which seldom prove critical, and terminate the disease. Neither do they, unless they suppurate, aggravate it; on the contrary, I have remarked, that when they appear early, they formed rather a favourable prognostic than otherwise. The pulse varies in different subjects and under different modifications of the disease: it is, however, quickened in most instances, and the breathing is usually accelerated in the same proportion; but unless the febrile symptoms run very high, it is not often that the pulse is very full, or very hard. A remarkable prostration of strength soon follows the formation of the fever, and the suppurative process. Thus about the third or fourth day, the horse, on being moved from his stall or box, will usually be found much weaker that the violence of the accompanying symptoms would give reason to expect. This is so generally observed, that the attendant debility alone is a marked characteristic of the disease, and I think of the specific nature of the fever which accompanies it.

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[*] Mr. Wilkinson, of Newcastle, who appears to have seen much of the epidemic catarrh, describes it as decidedly contagious, and marks the differences between the two varieties on the frame. Gibson, who gives a very excellent account of its ravages in London in the year 1732, informs us that it proved itself highly contagious. His description of the symptoms are well detailed; and we are informed that he found benefit from bleeding when the irritative febrile symptoms ran high; neither did he find that such a plan stopped the purulent secretion, but, as he thinks, rather prevented it running into gangrene. In 1734, we learn from him that it appeared again, and was accompanied with vesicular eruptions over the body, and which are, he observes, peculiar to the catarrh in the *epidemic* form. Osmer is no less particular in his description of it, as it raged in 1750 as an *epidemic*. He advises bleeding in the early and highly inflammatory stages: in all others, he observes, it does harm.

[†] As this disease may be considered as principally seated in the mucous linings and dependencies of the nasal, pharyngeal, and laryngeal cavities, so there are certain catarrhal symptoms common to all its cases; but as these several parts are often affected in unequal proportions, the predominant symptoms of such individual affections are found by experience to give great variety to the complaint. To this we are to attribute the discrepancies in the symptoms detailed and treatment pursued between different practitioners, as well as its variations in different seasons and different districts. This is a matter it behoves the prudent practitioner to keep in mind; and also that in some cases it presents most of the inflammatiory type, and in others is mixed with typhoid symptoms.

About this time, if the complaint be of the mild kind, and if the treatment have been judicious, although the purulent discharge may rather increase than diminish, yet the severity of the other symptoms may be expected to abate. The cough and soreness of throat will lessen, the pulse moderate, the heat of the body will become equable, the countenance more lively, and the horse will now probably be disposed to eat some favourite food. The dung, which has been before dry and in small quantities, and the urine, which has been also spare and high coloured, return to their natural states, and the horse recovers gradually, but seldom rapidly. The disease, however, does not always take this favourable turn; on the contrary, by injudicious treatment, or by the violence of the attack, or by a translation of the inflammatory action, the respiration sometimes becomes greatly disturbed, occasioning much heaving at the flanks; the legs, ears, and muzzle become cold, the pulse is found greatly quickened, and the weakness excessive. The nasal membranes now often look in some parts livid, and in others of a fiery red: the discharge from them also is tinged with streaks of blood. In these cases, unless relief be speedily obtained, the pulse will proceed to falter, cold sweats appear, and the animal often sinks on the fifth, sixth, or seventh day. In other cases, these fatal symptoms are not so rapid; but, eventually, the horse becomes tabid, and dies after ten, twelve, or fourteen days. Not unfrequently also, when the inflammation has extended to the lungs, serous effusion takes place, as in pneumonia, and suffocation closes the scene. In some instances a partial recovery takes place; but the horse remains thick winded, or he proves a roarer, or the disease blocks up the air cells, and he becomes altogether broken winded; which several terminations are more fully detailed in Pneumonia. Catarrh sometimes takes on a *chronic* form, after its more prominent irritative symptoms have disappeared; in which cases the discharge from the head continues for weeks, and even months, and unless put a stop to by active tonics, and a complete change in the system, may end in glanders.

Causes.—These have been described as principally dependent on a variable state of the atmosphere, acting upon a peculiar liability or aptitude in the constitution to become affected, more particularly at the vernal and autumnal equinoxes. In some years, this liability is more general than in others; and if to these be added an unusually variable temperature, with atmospheric moisture, the disease assumes a severer and more epidemic type.

Prognosis.—This must be drawn from the mildness or violence of the general symptoms, as the quickness or moderation of the pulse, the state of the breathing, and the early and kindly discharge of a moderate quantity of healthy purulent matter from the nose. When the patient coughs strong and without much distress, eats moderately, and remains tolerably free from weakness, there is little danger: but if, on the contrary, the local and constitutional symptoms are inordinate, and the prostration of strength very great, particularly when these are protracted beyond the fifth day, the danger is considerable.

Treatment of the Epidemic or Catarrhal Fever.—According to the degree of violence exhibited by the symptoms, so must the treatment correspond in activity; and before this is detailed, it is proper to remark, that when a cold fit immediately precedes the attack, and such is detected, similar means to overcome this premonitory symptom may with propriety be tried as are already detailed under Simple Fever; but they must not be persisted in. Commence the treatment by abstracting blood to the amount of three, four, or five quarts, according to the age, size, and condition of the subject; but should a practitioner be called to a case of this kind the third or fourth day from the attack, he ought well to examine the state of the pulse before he proceeds to bleed. It would also be prudent to examine the general strength of the horse by walking him out a few paces; for if the pulse, though quick, should be small, and the horse stagger in his gait when taken out, then by no means draw blood. But, having employed one sufficient bleeding, unless urged to it by the intensity of the irritative symptoms generally, or by any appearance of topical affection of the lungs, do not repeat it; our best practitioners are decidedly against it, and, according to my own experience and opinion they are right. The bowels must early be attended to: if any actual costiveness is present, back rake, and open the body by laxative clysters and bran mashes; and if these do not succeed, give some mild aperients by the mouth also (see *Laxatives*, *Mat. Med.*), but actively purging the horse is not prudent, but the contrary; and also observe, that should spontaneous purging come on and not appear critical, by its affording almost immediate relief, check it by opium, starch, or catechu. These indications fulfilled, proceed to give the following ball twice a-day:—

No. 1.—	Antimonial powder	two drachms
	Nitrated potash *(nitre)*	three drachms
	Supertartrate of potash *(cream of tartar)*	two drachms
	Honey, sufficient to make a ball.	

Should the cough be distressing, or the throat be too sore to admit a ball, then the following drink may be substituted with advantage, and may be repeated twice or three times a-day, according to the urgency of the symptoms:—

No. 2.—	Tartarised antimony *(emetic tartar)*	two drachms
	Nitrated potash *(nitre)*	three drachms
	Simple oxymel (see *Mat. Med.)*	four ounces.

First dissolve the antimony and nitre in six ounces of warm water, and then add the oxymel. It may also, in case the febrile symptoms do not readily yield to the treatment, be proper to try the effects of nauseants: if costiveness be present, mild but repeated doses of aloes may unite both intentions; if the bowels be already in a soluble state, other active nauseants may be used.

As the debility usually present in these cases must be an especial object of the practitioner's notice, and should be judiciously combated by such mean as will not irritate, linseed tea, made moderately thick from infusions of hay or malt, or oatmeal gruel, should be horned down, if not voluntarily taken; and if the soreness of the passages be so excessive as to make the horse obstinately refuse his own efforts to swallow, or those used to horn him, then use the stomach pump (see *Mat. Med.)* to introduce it. These matters may also be thrown up as clysters. Tepid water should be frequently offered the horse, and it should be placed nearly on a level with his breast, and suffered to remain so, the soreness of the throat often preventing the horse from stooping, though he might otherwise be inclined to drink. Malt mashes, in cases where some appetite remains, are good. Green meat, if it can be procured, is particularly desirable. Hand-feeding with choice picked hay (clover hay will be often preferred) will frequently entice a sick horse to eat. If possible, try either of the following, which I used in these cases with much success:—

Nitrous æther *(sweet spirit of nitre)*	one ounce
Acetated liquor of ammonia *(Mindererus's spirit)*	six ounces

Or,

Carbonated ammonia *(spirit of hartshorn)*	six drachms
Warm ale	a pint.

When the sore throat is a predominating symptom, apply a mild blistering application to it, and do the same also to the tumefied submaxillary glands, or the parotids when similarly affected: infusum lyttæ, or the mild sweating blister as it is called, will prove a convenient application for this purpose (see *Mat. Med.)* Early in the complaint, of course, our endeavours are directed to obtain a perfect resolution of the inflammatory attack on the mucous membranes; but these having failed, proceed to assist the maturative process, to which end warmth tends; as one means to apply which, a hot mash should be constantly kept in the manger, or, what would be much better, when the state of the horse is such as to bear it, to hang it to the head by means of a nose bag, the mash being put in hot, and renewed every hour or two, which will greatly tend to bring the vessels to a suppurative process, terminate active inflammation, and prevent the throwing out of coagulable lymph either in the trachea or bronchia; which should be, to the practitioner, a desideratum of the utmost consequence: for, if catarrhal fever be early brought into a suppurative state of the nasal membranes, and the discharge from the nose be kept up without check from cold, the disease will rarely terminate in broken wind, thick wind, or chronic cough. This early discharge will be likewise promoted by clothing the head in a woollen hood; the body should also be warmly clad, and the legs also watched, that in case they become cold they may be hand-rubbed and wrapped round with flannel or haybands. In cases where a difficulty in swallowing indicates that sore throat is present, stimulate the parts around with a terebinthinated tincture of cantharides; or rub an ointment of a similar nature over the submaxillary localities. I am also disposed to strongly recommend Mr. Youatt's plan of keeping up a *surface warmth* by clothing; but at the same time to allow a free admission of pure air; and, if possible, let it be in an open box, or at least in a loose stall, which is a good nursery, and is further beneficial, as it renders all other exercise in protracted cases unnecessary, beyond that which the sick animal will take himself; for in walking horses out who still labour under illness, it should be remembered that exercise hurries respiration, and thus increases the circulation:

The *malignant state of the epidemic catarrh.*—It has been doubted whether horses are subject to any fever which can be called either malignant or putrid; but whoever has observed a horse apparently first attacked with the mild or common epidemic, which then proceeded through all the stages of morbid debility to throw out the most fœtid sanies from the nose; the alvine, the urinary, and nearly all the secretions betraying the same fœtor, and, at last, to present the whole cellular membrane affected with serous effusion, termed water farcy, cannot then doubt the existence of a putrid affection in them; and this the less when we remark their liability to it, which is such that they have received it from horned cattle, of which many authenticated records are before us. All the French veterinary authors describe this disease. Bourgelat treats largely on it; and La Fosse, among other symptoms of putridity, notices the existence of aphthæ or thrush throughout the mouth, throat, and alimentary canal. Other authors, likewise, mention an epidemic among horses, accompanied with a phlegmonous tumour, similar to the human anthrax, which did not proceed to suppuration, but fell immediately into gangrene[*]. Lancisi, an Italian veterinary writer, describes a putrid epidemic that destroyed many horses in that country in 1712. Osmer also, a well-known English veterinarian, notices an epidemic among horses, that had evidently some putrid appearances, and was undoubtedly of a malignant kind, from what he terms the critical abscesses, and which distemper, he says, had raged for more than fifty years, at different periods[*]. It appears to have been known also to the ancients; and we learn from history, that they were in the habits of sacrificing to their deities to avert the calamity. Franciscus Fantasti, and John Baptist Mazzini, who have written *De Peste Boum*, inform us, that the horses of their country became, in like manner, infected with it. Have we, therefore, any room to doubt, that not only is the horse subjected to an epidemic, but that it is very frequently in a catarrhal form? and further, it is occasionally so malignant in its type, and so completely destructive to the tissues it attacks, as to fully establish the presence of gangrene and mortification.

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[*] 'Les tumeurs charbonneuses, ordinairement uniques dans le cheval, se rencontrent quelquefois multipliées chez le bœuf et la vache: cette espèce de tumeur dans les bêtes à cornes est en général moins prompte, ansi que dans le cochon, mais ausi funeste que dans le cheval.' *Art. Charbon, M. Hurt. d'Arboval.* En 1712, on observa, parmi les chevaux, aux environs d'Augsbourg, une autre épizootie du typhus qui se communique aux bœufs,' &c. *Art. Typhus loc cit.* A communication of Professor Brugnone to the Academy of Turin, describes a malignant, pestilential, and contagious epidemic, of March 1783, which communicated among almost the whole of four troops of dragoon horses in garrison in Fossano, and proved very fatal. Inoculation with the venous blood of the infected on sound horses produced the symptoms of the same disease in twelve hours. The sceptic on the subject of malignant and putrid febrile affections in the horse would do well to read the full detail as it appears in Hurt. d'Arboval, under the article *Typhus;* as well the articles Epizootie, Charbon, Anthrax, and Angina, Glossanthrax, Bronchite, &c.

When the catarrhal epidemic assumes the malignant type (which fortunately is now not frequent, although formerly, when woods prevented a free circulation of air, and ere drainage had lessened the morasses, it raged with destructive havoc) it presents all the symptoms already detailed in an aggravated degree. The abscesses, if any have formed, send forth a sanious discharge, and appear gangrenous; every secretion is fœtid in the extreme, the prostration of strength is very great, ulcers line the nose and even the mouth, the pulse is greatly quickened, but small and wavering, and a fatal termination, unless averted, is at hand.

Treatment.—Whenever the common epidemic rages with peculiar violence, carefully abstain from bleeding in such cases; and as soon as any symptoms of malignity present themselves, the most active means must be employed to support the strength and destroy the putrid tendency. The temperature around should be rendered cool, fumigations of hot vinegar frequently used, and the disinfecting processes be put into practice (see *Disinfectors*, *Mat. Med*). Green meat should be given, malt mashes also, and nutritious clysters; and when the weakness is extreme, or the appearances of putridity great, give port wine, ale, or cider, and in case of diarrhœa throw up starch clysters. The following may with great propriety be administered every four hours:—

Nitrous æther (*sweet spirit of nitre*)	half an ounce
Mindererus's spirit (see *Mat. Med.*)	four ounces
Infusion of chamomile	six ounces
Beer yeast..	six ounces
Tincture of opium	three drachms.

SYMPTOMATIC FEVER OF HORSES.

By this is to be understood those general febrile appearances which accompany great local inflammations; that is, when any one or more of the vital organs are extensively deranged, the system at large participates, and the intensity of the vascular action is diffused throughout the system, which constitutes *symptomatic* or *compounded fever*. It is evident, therefore, that fever, in this instance, is not to be regarded so much a disease *per se* as a prominent symptom; and as such it is to be considered in practice also: medical attention to it being usually but a secondary indication; nevertheless, as it sometimes runs so high as greatly to aggravate the other symptoms, wearing away the strength of the animal, so as to render him unfit to struggle with the real disease, it must still be regarded as a subject worthy of consideration. It is the most frequent fever of horses; because it is an attendant on all serious topical attacks of the more important parts of the body. The medical treatment of it will naturally mix itself with the curative practice employed in combatting the diseases hinted at. We must, nevertheless, acknowledge that a difficulty presents itself at the outset, which is this, that frequently it is not easy to determine whether the febrile disposition be antecedent to the local inflammation which then becomes a consequence of it, or whether it be produced from it in the nature of metastasis; but, I believe, from what I have observed, that local inflammation originates in both these ways. On the first attack of most fevers, there appears to be a particular disturbance in the action of the capillaries: perhaps the application of a peculiar morbid stimulus, which first increases their action; by which excitement the blood is driven into the veins, and this state probably forms the cold shivering fit. When this first effect is completely over, these vessels, before excited in their contractility, now become preternaturally enlarged, by the heart and larger arteries overcoming the resistance, and propelling an unusual quantity of blood into them, and more than ordinary heat is the consequence. It is probable that when all the organs are acting in concert to overcome this contraction of the extreme vessels, some one part may be more weakened than another by the exertion, and its minute vessels rendered less able to contract on the distention that follows upon the hot fit, by which the weakened coats may remain permanently distended, thus constituting local inflammation of that part; the irritation and derangement of which will keep up that fever as symptomatic, which before the local attack was primary: thus much must take place, to account for local inflammation arising from the attack of fever, and proceeding from it, which I believe is very frequently the case. It likewise is not difficult to suppose one organ in an accidental or even natural state of weakness, and which, in such cases, will be the one most likely to suffer; and daily experience convinces us, that such is the origin of many local inflammations.

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[*] Memoire sur une épizootie qui se manifesta sur les chevaux du dépôt du 20th régiment de chasseurs en garrison á Metz; suivi d'un aperçu de celle qui a régné en l'an 2 sur les bêtes à cornes de la commune de Tramois; par J. B. Gohier, Lyon.

The *treatment* of symptomatic fever, as a febrile affection, requires to be conducted on the curative principles indicated under Diffused Inflammation, which see: but the existence of the topical affection will frequently render it necessary to superadd to *generals* such *particulars* as are pointed out under the various local affections of individual organs. When we have been, during the prevalence of catarrhal affections, called to inspect a horse just attacked, we have sometimes paused under a suspicion that it might be only a transitory rigor, and that a stimulant might overcome it, and at once set the horse to rights. We will not affront the veterinarian by dictating what stimulant he should choose among the varied articles so employed, but will leave it to his own judgment; hinting only no time should be lost, and that a good drench of sound ale warmed, and having in it a toast well sprinkled with ginger or nutmeg, or both, will offer a temporary substitute until more active medicaments can be procured*.

THE FEVERS OF HORNED CATTLE.

The diseases of the other of our domestic quadrupeds, particularly of the horned ruminants, in a national point of view, can hardly be considered as less important than those of the horse†; yet they had hitherto met with little attentention among us; and even the continental rays which illumined the horizon of our neighbours, our ignorance and prejudice intercepted. But at length a new era has sprung up, and schools are now established to remedy this sad deficiency; and it is also promised that we shall henceforward look to our alma mater at Pancras for instruction on the curative treatment of all our domestic animals generally. If that indefatigable and excellent veterinarian, Mr. Youatt, and certain of his coadjutors and correspondents, had done nothing more than promote a scientific inquiry into this important subject, they would yet have left an imperishable monument to their fame.—The prominent fevers of cattle I shall consider as simple inflammatory fever, puerperal fever, and fevers mixed or typhoid, exhibiting either malignant, epidemic, or contagious characters, singly or combined.

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* During the memorable expedition to the Helder, under Sir Ralph Abercrombie, I was stationed in the advanced lines as surgeon to the second battalion of the 40th regiment. The troops so stationed were usually under arms every morning by break of day, to prevent surprise: and, in that unhealthy country, the standing exposed for two or three hours was found to occasion many intermittent attacks; the first rigors of which always took place while thus in line and unemployed. At first, as soon as an attack took place, the man was ordered out and retired; in which case, when I next saw him, though only two or three hours afterwards, the hot fit had supervened, the disease was formed, and usually ran through its course. This began to be so frequent, that our ranks were likely to be thinned, and I resolved on attempting at prevention in preference to cure. In future, therefore, whenever a man began to complain, I was instantly informed of it; and, instead of allowing him to retire, I gave him on the spot from two to three grains of opium, nipped from off a piece I kept in my pocket for the express purpose. I then ordered him to be walked briskly for half an hour between two men, and afterwards to fall into the ranks again. So efficacious was this plan of combatting the incipient disease, by a stimulant greater than the morbid one, that not one in ten of those in future attacked on the spot had occasion for medical assistance afterwards.

† When we are told that there are five millions of cattle, thirty millions of sheep, four millions of swine, and two millions of dogs in our island, we cannot but feel that there is an imperative call made for us to inquire fully into the means of sustaining in health, and of remedying the diseases, of such a vast and valuable mass. In this almost untrodden field, a harvest of credit and emolument presents itself to the veterinarian, and one without chance of disappointment. It must, however, be entered upon on sure grounds. What are they? We answer, a competent knowledge of the immediate structure, functions, and economy, of the animals in question. For even on a supposition that these principles are already well understood in the horse, it is still essentially necessary that we become acquainted with the physiological and pathological differences which result from the structural deviations from the equine type; and also what specific or peculiar diseases belong to these animals unknown to the other; and what are the different effects of medicinal agents on them. To the increased dimensions of the vascular system of the ox beyond that of the horse we attribute the disposition in him and his kind to greater inflammatory diathesis, and to the increased rapidity of its course, which consequently calls for a still more prompt and active treatment in the one than the other. Rumination makes much difference between the horned and whole-hoofed tribes, both as regards function and diseased aptitudes; while the more numerous metatarsal and metacarpal bones of the former at once decrease the comparative tendency to some derangements, and increase it to those of others. 'Farcy; glanders, strangles, grease, and thrush, are peculiar to the horse; the hoove, inflammatory fever,

The fevers of neat cattle have many absurd, though, under some points of view, expressive names, as *Hose*, *Distemper*, *Black quarter*, *Joint felon*, *Quarter evil*, *Quarter ill*, *Shewt of Blood*, *Joint murrain*, *Striking in of the blood*, *Black leg*, *Blain of the tongue*, *&c. &c.*[*] In some years these febrile affections rage as an epidemic, either from too luxurious pasturage, or from meagre feeding in bad pasturage, and sometimes it seems to arise from a sudden remove from meagre to a more nutritious one, and hence it is very common among the droves brought from the north into the luxurious pastures of the southern, midland, and western districts. It is sudden in its attack, and rapid in its progress, presenting highly inflammatory appearances in its early state, but which are very apt to degenerate into a low and putrid type; as, indeed, do most of their inflammatory affections. The first symptoms usually betrayed are general stiffness of the limbs, a dull heavy countenance, red eyelids and nostrils, pulse sometimes quick and hard, at others not much affected, breathing accelerated and sometimes difficult, which is further evinced by the open mouth and outstretched head; stools slimy and usually of a drier consistence than natural. It is often attended with great stupidity and disinclination to move, but occasionally there is much restlessness; debility comes on early, particularly in the hinder quarters; and by the second day the animal cannot remain standing but a short time. Rumination and inclination for food ceases; the breath emits a fœtid exhalation, and frequently on the second day a critical deposit takes place, which terminates the inflammatory action. This deposit, in some, proves an universal diffusion of bloody serum throughout the cellular membrane; in others, inflammatory phlegmonous tumours form on the joints, or on the back or belly. From the putrid tendency in the complaint, a quantity of gas is likewise let loose within the cellular membrane in some instances, which produces a crepitation or crackling under the skin, similar to that which appears in veal when blown up by butchers. The secretions are grumous, and emit a horrible fœtor; under which symptoms, unless speedily relieved, the animal sinks; and it may be remarked, that after the critical deposits have formed, the disease usually assumes a more putrid type, and proceeds in its malignity in the same degree of rapidity that the early stage ran in inflammatory action.

Wood-evil, pantas, and moor-ill, may with propriety succeed the above as congenerous members of the list. Variable symptoms, however, will, without doubt, mark each of these diseases, but their grand febrile characteristics will bear similar features, and the ailment will require a treatment based on the degree of morbid malignancy present, the strength of the animals attacked, their age, and the organs principally affected. It is not the local names that should be attended to by the practitioner; nor can the localities themselves, as woody

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foot-rot, to cattle and sheep: the scab and rot to sheep; that tuberculous affection of the skin and cellular membrane, termed measles, to the hog; and distemper and canker to the dog.' Of the different effects of medicinal agents on our domestic animals, enough will appear in the *introductory chapter to the Materia Medica* to shew that an intimate acquaintance with them is likewise essentially necessary.

[*] It must be observed, with regard to these names, that as they were most probably derived from the leading symptoms of very distinct affections, as topical attacks on individual portions of the aerating and alimentary passages, and of the viscera themselves, so our further acquaintance with the diseases of these animals will hereafter separate and widely disperse them, leaving, probably, but few under the department of *synocha*.

districts or the open moors, have such decided power over these ailments as are stated. The herbage of the lowlands, particularly in wet seasons, may somewhat vary the symptoms; nor do we deny that the eating of the willow leaves and hedge browsings may not, in a certain degree, alter the complexion of the complaint; but the more important symptoms will remain, and the proper treatment also must be persisted in. A cold wet season has much influence in engendering these latter diseases: nor, from what I have seen of them, is marsh miasmata without a powerful influence thereon. Thus it is, that in the lofty moorlands of the north they prevail equally as in the lower and moister grounds of the south. The diseases to which we allude often commence with rheumatic symptoms, and may then be successfully combatted in this instance with No. 1 mixture, and in the next with No. 2. In fact, each patient should be liberally supported with mild antiputrescents, and with sound ale and ginger in powder when the powers flag greatly.

The Treatment.—When the disease is detected before the skin crepitates, or before swellings have formed, bleed to the amount of three quarts, and immediately give a mild purge: but if critical deposits have been made, be more sparing of the lancet, and also of the purging, unless the pulse should still remain very full and strong, in which case the purge may be administered; and when that has operated, proceed to give the following night and morning:—

No. 1.	Nitrous æther (*sweet spirit of nitre*)	an ounce
	Acetated liquor of ammonia (*Mindererus's spirit*)...	six ounces
	Strong decoction of chamomile	six ounces;

Or,

No. 2.	Beer yeast..	six ounces
	Powdered ginger	an ounce
	Ale or cider	half a pint

The swellings may also be rubbed with yeast or beer grounds; but the puncturing of the emphysematous tumours, unless they be enormously large, is not to be advised.

The *inflammatory fever of sheep* called *Sheep fever*, *Higham striking*, or *Blood striking*, present similar *symptoms;* neither does the proper treatment differ from that of neat cattle, making allowance in the proportions of the medicaments for the different proportions in bulk and strength of the animals.

TYPHOID FEVER IN HORNED CATTLE.

This fever, which is little more than an aggravated state of the former, presents itself under several varieties, very commonly as phlegmasiæ; the local affections, however, usually soon blend themselves with a general typhoid or asthenic type of disease. The inflammatory attacks by which the complaint in its epidemic form is hurried in, are also various, but more with reference to the type manifest in different seasons than of the groups of animals attacked during any one of the periods in which it rages. In some years, the accounts describe it as commencing with glossanthrax or blain, or with pharyngitis, œsophagitis, gastritis, or enteritis; shewing that the alimentary canal is the local object of attack. In others, the aerating passages exhibit marks of *general* affection, in the shape of catarrh; or *individual* parts, by symptoms of laryngitis, bronchitis, pleuritis, or pneumonia. The viscera also are sometimes the primary object of attack; and sometimes it is the cellular tissues, which then throw out pustular eruptions, carbuncles, &c. Its *destructive* characters have fixed on it the names of *murrain* and *pest;* as its occasionally more *mild* ones have that of *distemper*. My limits will not allow of any lengthened detail of its ravages; but I would recommend that reference should be made to the pages of *The Veterinarian*, throughout; an attentive examination of which will afford every facility to a just knowledge of this putrid or typhoid affection, and the curative means employed thereon. I must content myself with an outline of its history, and a sketch only of its medical treatment. It was not unknown to the ancients; but the accounts they left of it were neither numerous or precise. Among the moderns but little was written on the subject before the beginning of the eighteenth century, during the first half of which it became very prevalent on the European Continent. In 1710, 1711, 1712, and 1713, it raged throughout Hungary, Italy, and Spain. The years 1730 and 1731, 1740, 1744, 5, and 6, were also memorable for its destructive visitations over various and extensive portions of the continent Of its leading characters an excellent account is left us by M. Sauvages, the illustrious professor of medicine at Montpelier. He described it as very fatal, and as commencing by loss of appetite, dejected air, head held low, sight indistinct, restlessness, tremblings, staring coat, cold exremities, and defluxions from the nose and eyes, which excoriated the parts they came in contact with. The respiration became laborious, the pulse accelerated, and disposition to lie down: early costiveness, which was soon succeeded by diarrhœa of green fœtid evacuations, of such frequency as often to destroy in twelve hours: tenderness about the withers, with emphysematous swellings, were common. Dissection presented, we are told, marks of inflammation, but seldom of gangrene; which serves as another proof how variable are the characters of epidemic diseases: and, perhaps, bespeaks some little leaning in this professor to a favourite theory: for the account states, that the paunch was generally filled with undigested food, and that the other stomachs and the intestines were inflamed and *livid* also; while the gall-bladder was usually distended with *acrid, dark, thick bile*. An early bleeding was recommended, but it was not to be repeated; purging was to be avoided; an excitement to salivary secretion, slight cuticular punctures to let out the emphysematous air, drinks acidulated with vinegar, and mild astringents, to arrest the diarrhœa, were the other curative formulæ.

England, we are told by Hurtrel d'Arboval, was visited by this fever in 1714, and which proved with us as fatal as on the continent; in some cases expending itself in a most virulent defluxion from the pituitary membrane, with little other morbid appearance: in others, by an equally morbid diarrhœa or dysentery. Some of these cases were marked by the *blain* on the tongue, as well as by *carbuncles* over the rest of the body. In 1756 and 1757 it again made its appearance among us, and the press gave several accounts of it, one of which, by Dr. Layard, deserves attention, His account described it as first appearing by a difficulty in swallowing, itching of the ears, involuntary motion of the head, and staggering gait; to these succeeded extreme debility, and desire for rest; much cough, and exacerbations of fever which were greatest at night: there was constant diarrhœa, the perspiration had a disagreeable smell, and small tumours were felt under the skin in passing the hand over the body: these symptoms were seen to be aggravated usually on the seventh or ninth day, at which time, if the body became covered with large pustules or tumours, which proceeded to suppuration; if the fæces became less liquid, and the urine thicker or less pale, the prognostic was favourable; but if, on the contrary, the diarrhœa continued beyond this period, if the breath continued hot and the body cold, and the discharge from the eyes and nose increased, the animal appearing in pain, then death was usually near.

The *treatment of the complaint* under its most malignant types our practitioners are fortunately but little *practically* acquainted with; but we learn from various sources, that its rapid progress to a fatal termination renders it necessary that it be as prompt and decisive as it must be judicious: the *general* view taken of it being, that it is an affection equally malignant and contagious: the *particular* view must, therefore, be regulated by the immediate circumstances of the individuals attacked, as well as by analogies drawn from previous cases. It is very common for it to make its appearance by *glossitis* or *blain under the tongue*, and which is often succeeded by *glossanthrax*. This, however, is not a necessary connexion; glossitis appearing sometimes in pharyngeal angina in horses, cattle, dogs, and swine, as a phlegmasia without malignant or contagious characters. But when blain does appear with it, it is usually as a malignant epidemic: we should pursue the plan recommended by Mr. Youatt in his excellent paper on the subject, in the 4th vol. of *The Veterinarian*, to freely lance the glossitic vesicles from end to end; or if ulceration is already established, 'to wash the mouth with a diluted solution of chloride of lime (one part of the saturated solution to eleven of water). This will act as a powerful disinfectant, and likewise as a useful stimulant to the foul and indolent ulcer.' Hurtrel d'Arboval also recommends opening of the vesicles; and further, to scarify the tumid portions around them, cauterising such as are gangrenous with the nitrate of silver (lunar caustic), or the hydrate of potash (caustic potash). If deeper-seated anginas prevail, the local applications must vary, and external stimulants and internal acidulated or soothing lotions will be indicated, with fumigations also: the inflammatory symptoms, if acute, must be likewise attacked by one or two early bleedings, particularly if there be any visceral affection; and when the type of the complaint of that period has not generally ended in diarrhœa, it will be prudent to promote mild purgation. In such cases, on the contrary, as indicate diarrhœa as a part of the affection, the most active means must be resorted to to arrest this most fatal symptom (see *Diarrhœa*). The carbuncles or tumours of the body at large, which form so frequently a prominent feature in the epizootic epidemy, must be an object of attention: the continental veterinarians scarify them deeply, and treat the ulcers which they produce with active escharotics and antiputrescent washes. Internally they exhibit various medicaments, among which bark and sulphuric acid may be noticed. I would recommend the following every four hours:—

Cascarilla bark in powder	two ounces
Nitrous æther..	half an ounce
Acetated liquor of ammonia	four ounces
Beer yeast	eight ounces.

The *preventive treatment* must consist in first separating the infected from the healthy, and strictly preventing their future intercourse. The unhealthy districts should be put under strict quarantine, and such as are yet healthy should destroy the germ of contagion if possible, by repeated and extensive fires of green wood throughout the country: particular care should also be taken to house the cattle when the weather is intemperate; neither is it improbable that a mild purgative every ten days might do much as a *prophylactic*. The houses in which the affected may have been, and all their appointments, should be disinfected. (See *Disinfectors*, *Mat. Med.*) The bodies also of the animals who die from the disease should be buried sufficiently deep to cover them from dogs, &c.; and their skins should be buried with them[*].

PUERPERAL FEVER IN CATTLE.

This affection is much more common in cows and sheep than in mares, which is a singular deviation from the ordinary rule, that the dangers attending the grand work of reproduction are multiplied in the degree that animals recede from a state of nature, as is the case with the mare, which is very seldom attacked with this fever, however highly bred animals recede from a state of nature.—*Dropping after calving*, or *milk fever*, as it is called, occurs at an early period after delivery, as from the first to the fourth day, and may be sometimes traced to violence, at others to exposure to either cold or wet, and more often the cause is altogether hidden from us. Mr. Youatt says, 'that cows in high condition are most subject to it. Their excess of condition disposes them to affections of an inflammatory character at all times, and more particularly when the constitution labours under the high febrile excitement accompanying parturition. It is not, however, peculiar to these, but the poorest and most miserable cattle are occasionally the subjects of this disease; and especially if, on account of their calving, they have been moved from scanty to luxuriant pasture, or from low keep to high stall-feeding. A great deal depends on the quantity of milk which the cow naturally yields. The great milkers are the most subject to it, and they are not always in the best condition. If from some affection of the system the secretion of milk is stopped (and the stoppage of the milk is an early symptom, and one of the most frequent), it is easy to see that the violence of the subsequent fever may bear a near relation to the quantity of the suspended secretions. It has often been observed that the udder has been enlarged and become hot and tender a day or two before the attack. This enlargement and inflammation of the bag is generally attended by partial or total suspension of the milk.

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[*] For the agriculturist who may wish to prosecute his inquiries on this subject further, it may not be uninteresting to note the Continental works which contain the best information thereon:—Examen de la notice sur l'epizootie qui régna sur le gros bétail, par MM. Girard et Dupuy, Directeur et Professeurs à l'école Véterinaire d'Alfort.—Essai sur les epizooties, par M. Guersent, Paris.—Marasme (du) épizootique, des fourrages extraordinaires & de l'emploi des matières animales pour restaurer les herbivores, ou instruction sur les moyens d'arreter la mortalité du bétail qui perit d'épuisement: par Collaine.—Memoire sur la maladie épizootique régne en ce moment 1814, sur les bêtes a cornes, dans le département du Rhône et ailleurs, par J. B. Gohier, Lyon.—Rapports et observation sur l'épizootie contagieuse régnant sur les bêtes à cornes de pleusieur departemens de la France. It will also be found very fully detailed in the excellent Veterinary Dictionary of Hurtrel d'Arboval, under the articles *Epizootie*, *Typhus*, *Angina*, &c.

The *symptoms* of this complaint all betoken phlegmasiæ, in the early stages at least; but they differ according as other viscera besides the uterus partake of the affection. There are usually restlessness, irritability, shifting of situation, pawing of the feet, quickened respiration, mouth hot and dry: the pulse, Mr. King[*] observes, is usually slow; and in some cases it certainly is so; in others, however, particularly in the early stage of the disease, it is considerably accelerated. Excessive uneasiness and prostration of strength succeed to these; the cud is lost, and all appetite ceases: the hypogastric region, before only hot and tender, now begins to swell, in which at length the abdomen generally participates, by the extrication of gas from the contents of the paunch. It is now that it assumes its typhoid type, and after this it runs rapidly the remainder of its fatal course in most cases.

The *treatment* in the early stage calls for bleeding, and that liberally; but the practitioner must make himself well aware that it is an *early* state of the complaint to which he is called, or bleeding may not be so proper. Mr. King is unfavourable to bleeding in it at all. Mr. Youatt thinks a copious early bleeding proper, and other successful practitioners have done the same; nor are there wanting proofs of its absolute necessity in the outset of the complaint, and a Mr. Lythe, a practitioner of much experience, expressly states that he has seen many cows lost from neglect of early bleeding, but which we also beg to observe can seldom with safety be practised beyond the second or the third day at most; after which, even spontaneous evacuations from the bowels must be checked. To promote, however, early evacuations from the bowels, to try the following is good practice:—

Epsom salts...	six ounces to eight
Powdered croton seed	half a drachm to two scruples
Powdered ginger...............	half an ounce to six drachms.

Mix these, and give in three or four pints of substantial gruel: repeat the same in six hours, doubling the quantity of ginger, but omitting the powdered croton seed, unless the costiveness be very obstinate. If the belly swells much, foment it actively. Some practitioners afford benefit by drawing off the urine every four or five hours; nor can we do other than to laud the practice. If the morbid symptoms continue, horn down plenty of substantial gruel, with mild ale and treacle intermixed. We recommend this from accidentally witnessing its beneficial effects on a valuable Norman cow. In all cases of puerperal fever, therefore, combat a strong pulse with blood-letting and purging; but as the pulse softens, and the other active inflammatory symptoms lessen, be careful that active purgation is not longer promoted; as well also be aware that spontaneous diarrhœa, unless critical, should be checked. The strength must be supported by liberal drenchings of sound ale, with aromatic bitters intermixed; malt mashes may be offered also. Give likewise the following drink twice or thrice a-day, according to the urgency of the symptoms:—

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[*] Mr. King, of Stanmore, an experienced and observant veterinarian, has informed us that this affection seldom occurs at the first or even second calving, but is peculiar to parturitions subsequent to this; it does however occasionally happen at the first calving. It appears fully as probable that the stoppage of lochia may be an excitant, as that of the milk, which though an occasional cause, is, I think, more often an effect. Mr Goodwin is not of opinion that the disease is of an inflammatory nature, but, on the contrary, he considers it rather a diminution of nervous energy, and connected with an atonic state of the abdominal viscera. It certainly in its early stage presents inflammatory symptoms, and it is equally so that in its later it assumes typhoid marks, and sometimes even epidemic characters, and appears under such circumstances contagious also.

Powdered cascarilla bark......................	two ounces
Nitrous æther	one ounce
Acetated liquor of ammonia	eight ounces
Strong chamomile infusion	eight ounces.

In these cases occasionally there is tympanitis, which when it becomes so great as to threaten suffocation, the gas should be evacuated by the tube or by an opening, as in the affection called *hoven*. From many sources we are indeed led to observe on the intimate connexion between this complaint and the hoven. In its most acute form the symptoms are precisely similar, but it must be remembered that in the prolonged and typhoid stage the identity is not so strictly preserved.

PUERPERAL FEVER OF SHEEP.

The puerperal fever of sheep seems even more fatal and rapid than that of cows, and consequently it requires more prompt treatment; but it is not essentially different, except that less that half the quantity of the medicaments will be required. Should the weather be either cold or stormy, house both cattle and sheep, which we strongly recommend, as they can be foddered if any symptoms of hunger manifest themselves.

MAMMITIS, OR INFLAMMATION OF THE UDDER IN COWS.

This subject may with much propriety follow puerperal fever in cattle. It is certainly not a very common complaint, but as it usually attacks cows with the largest udders, and the best milkers, so it deserves our notice. A French author, M. Pierre Lecoq, M.V., has treated of this affection with much credit to himself somewhat after the following manner in *The Veterinarian*, vol. xiii, p. 665:—'The mammillary glands of the cow form an unique mass, composed of two symmetrical parts, simply united to one another by a cellular tissue, lax and very abundant. These are divided into two other portions, which pathological anatomy demonstrates in the clearest manner, and which are connected together by a compact laminous tissue. From each of these glands many tubes proceed, which unite to form a common excretory canal opening outwardly by means of an elongated mammillary body called a *teat*. At the back of each of these larger teats is generally a small one; but which, as it never furnishes milk, nor is the seat of any peculiar affection, we shall pass over in silence. These organs, destined by Nature to secrete the milk necessary for the nourishment of the little being to whom the cow has given birth, become the seat, at the period of parturition, of an organic process for the secretion of milk, and more active than at any other period of lactation; therefore, it is that, at the approach of this period, they are more subject to inflammatory affections than at any other time: and any cause which, at another time, would produce only a slight degree of irritation, now almost invariably gives rise to considerable inflammation. The cows most apt to contract this disease are those which have large udders, in whom the secretion of milk is most abundant, and who are, consequently, the best milkers. The season of the year, and the locality of the animal, seem to have little influence on the disease, whether they are at liberty in the pasture, or inclosed in the cow-house.'

Mammitis, like other inflammations of distinct organs, may terminate in resolution, suppuration, or gangrene. We saw an instance of this latter termination in Hampshire during our sojourn for a few hours in Southampton. It was, however, as we learned, almost a solitary instance. The practised veterinarian will attempt to produce resolution by a very mild and somewhat spare diet, by cooling and detergent lotions of acetate of lead or Goulard's extract kept constantly applied to the part. We have been told that a tepid decoction of camomile has been of service. If the engorgement should be considerable, would it be prudent to apply leeches? It would, perhaps, be hazardous as an operation, although, if it succeeded, it would turn out a fortunate one. Tepid fomentations, however, to a kindly animal may be used with advantage; and, as we read, blood should be by all means abstracted, if not by leeches by opening the subcutaneous veins of the parts around. Keep the body open to *keep down* the inflammation, but at the same time *keep up* the strength, and by all judicious means endeavour to prevent suppuration, which however will be too apt to occur, particularly should the teats swell, protrude in length, become very hot, and yield only a reddish serum. At this period carefully watch the progress of the complaint, still combat the fever internally and externally, and if the general strength flags give green food and malt mashes. As soon as the tumefaction of the udder presents a direct point on one or more of the dugs, apply the lancet, and watch that no gangrene supervenes without being instantly arrested.

EPIDEMIC CATARRH IN CATTLE.

I beg to premise, that until the *Influenzas*, the *Epizootics*, and the *Epidemics*, in all their varieties, are each individually characterised and appropriately named, it will not be an easy task to describe them satisfactorily. I fear that in my own detail, now entering on, I may in my descriptions mystify the intended instructions to those who have not had much practice on each of the diseases I shall enumerate; for be it observed, that during the same season, however critical may be the account rendered of an individual attack of any prevalent complaint, it is but little likely that it will correspond entirely with others that have preceded it, or those that may follow it. I shall, however, in candour state, that my own experience, though limited, fully accords with those who consider influenza in cattle as more frequently produced by a deleterious atmosphere than by any other agent whatever. Hence certain winds are apt to produce it, as a north-easter, particularly when it blows from marsh lands. This disease, however, presents many anomalies of type, of conflicting symptoms, &c. Its stronghold will be occasionally seen in the hills of Cumberland, and then again in the wealds of Kent. No situation that will present cold and moisture is exempt from it, and its virulence is in general commensurate with these two causes. I have seen it in the marshes of Essex and the fens of Lincolnshire committing great havoc; when rain and a north-easterly wind predominated together, two, three, four, and five *sheep* have been seen to mark the mortality of one night; but such cases are rare. *Cows*, not being usually liable to such extreme exposure, do not often remain to die thus neglected, although young beasts pasturing some distance from home do get thus overtaken; in which cases the disease soon assumes an acute form. As regards its prevalence, and its virulence also, when it attacks cows and oxen grazing on sea marshes, I can bear witness, having on one occasion seen a cow and her calf lying dead on one pasture. I was grieved, for I had on the previous morning seen these same cattle then labouring under an acute attack of this prevailing influenza in its most virulent form, and I gave information of the same; but a country fair had abstracted those that should have attended them, and I presume they died where I left them.

The symptoms of the acute form of the disease, as far as I have found them, are as follow. If an attendant is on the spot, his first notice is directed to a shivering fit, under which the ears, the legs, and feet become first cold, to which heat in most of these parts succeeds. The nasal membrane, at first paler than natural, becomes intensely red, and from it there exudes a watery secretion which, being at first thin, gradually thickens, and presents flaky masses. On the third day the strength of the animal decreases, and it is probable that it may in the interval have had alternations of hot and cold fits, with a teazing and even painful cough, as is evinced by impatience and stamping during the efforts. If the attack be very acute, the nasal discharge will, on the second or third day at most, become muco-purulent; all appetite will be lost, and even drink will be avoided by the beast, from the pain which swallowing it occasions. Swellings of the legs are common in these cases, and of the glands of the throat also. We have hitherto said nothing of the pulse, and our reason is, that it is seldom the same in any two cases. It, however, in most instances, commences by being somewhat quickened, and that it increases in rapidity as soon as the catarrhal symptoms have fully developed themselves. We will suppose a judicious medical attendant to be early called in, and that he will without doubt commence by a moderate bleeding, which he will repeat or abstain from, according to the strength and frequency of the pulse, the appearance of the blood, and the leading symptoms generally, whether they bespeak a highly inflammatory state of the circulation, or a tendency to an asthenic type. An irregular suffusion of the nasal membrane, a hot mouth, and a constant drivelling from it, with a vesication of its walls throughout, are common, and interfere much with mastication, rendering the breath of the animal extremely offensive. A discharge from the nose and eyes also is an accompaniment, and sloughing of the gums, when the disease is very malignant, is common. It was so seen in 1839, when the cows ceased to ruminate, and exhibited also a convulsive affection of the limbs. Either through weakness or from some morbid attack on the feet, the affected beasts are usually found lying down. Respiration is, in most cases, somewhat quickened, and each expiration is terminated with a grunt. The urine has usually in these cases been very high coloured; and we were told, by a cow-keeper who sought our opinion, that the fæces were almost invariably very dark, and often tinged with blood.

The remaining treatment must be conducted according to the progress of the complaint, its duration, the age and strength of the animals attacked. If the practitioner be called in on the first appearance of the disease while the affected beast is yet strong, commence with moderate bleeding; but unless the pulse rises while the blood flows, by no means continue or repeat it, particularly if the beast is not in good care, or of an age to bear depletion; for however moderate, should the vital powers flag much under it, the animal will be lost. This disease is remarked for its effects on the hide of the beast; the hair stands erect, or even points directly contrary to its usual state. A universal tenderness over the whole body, but particularly along the spine, from the head to the tail, is present in most; and it arrives to such a degree of tenderness, that should the back be pinched, the poor beast will almost fall. If the cow be a milker, she will day by day yield less to the pail, although at first the quantity was probably increased. One who has seen infinitely more of this epidemic than ourselves describes it as appearing both under a *chronic* stage, and also under an *acute* one; and as the distinction is important in practice, we will offer his account in his own words, trusting to his liberality and his zeal for the public good for forgiveness for the liberty taken. Mr. Evison, a respectable veterinary practitioner, in a very ingenious Essay on Influenza, read at the Veterinary Medical Association (*Veterinarian*, vol. xiii, p. 123), after a well detailed description of the general features of the disease, thus proceeds with its portrait as it is seen both in its *chronic* and its *acute* stages:—

'*In the chronic stage*.—The pulse is not accelerated, but is slow, and rather indicates debility. The mucous membranes are of a yellow colour, particularly the lining of the eyelids, plainly betokening a liver affection. Constipation is present, and much fever of a low type. The skin gradually becomes very yellow, and adheres closely to the body; the muzzle is dry, the ears and extremities are cold, the urine highly coloured, and rumination is partially suspended. If it is a milch cow, the milk is also yellow, and of a bitter taste: should a diarrhœa prevail in this stage of the disease, the patient is generally lost.

'*Treatment of the acute stage*.—Bleeding is not recommended, unless the pulse continues to rise after the flow, and the breathing becomes very laborious; then, perhaps, I should abstract blood, guided by the character of the pulse during the progress of the venesection, and, perhaps, I should be a little influenced by the age and condition of the animal. There is nothing so important as to husband the vital fluid at the commencement of these diseases in the ruminant. I would next insert a seton in the dewlap. The ointment of hellebore will produce the speediest and most abundant discharge. If the hoose or cough is severe, I should blister the throat. I have covered the whole of the trachea with a vesicatory, and with beneficial effect.

'As to the remaining remedial treatment, I usually commence with a draught composed of nitre, camphor, emetic tartar, sulphur, gentian, and ginger, in a quart of common water. The animal should be housed, yet have plenty of air: succulent food, and that which is easy of digestion should be given, as carrots, grass, and a little oil-cake, which will serve to keep the body in a relaxed state. Should the animal experience relief from the medicine, I would repeat it; but if the disease should appear disposed to run on to the *chronic state*, I would not bleed, but I would give half-pound doses of sulphate of magnesia and sulphur, with ginger and gentian; and, after having evacuated the bowels, I would exhibit small doses of calomel with tonics. When abscesses make their appearance, I would advise the application of a mild blister, so as to promote suppuration. As soon as any suppuration appears, the abscess should be freely opened, and when the pus has been nearly evacuated, some tow, saturated with digestive liniment, should be inserted, in order to keep the orifice open. I have frequently seen the orifice heal up when this has been neglected, and the abscesses in such case are apt to form again as large as the first, and then prove very troublesome to get rid of. The iodine ointment, I should remark, has often proved effectual in causing the dispersion of these tumours; but I confess that I am not an advocate for the absorption of these enlargements, for they appear to me to be foreign substances thrown out, of which nature seems to want to rid herself; and if they can be carried off externally, it is far better than to allow their absorption into the system.' Such are Mr. Evison's directions.

THE PARTICULAR CATTLE EPIDEMIC OF LATE YEARS.

We hardly need to inform our readers, that an affection of somewhat singular characters has raged among our cattle for some past seasons, particularly during the summers and autumns of the last few years. Many intelligent observers attribute the complaint to the effect of acrid plants, particularly those of the ranunculus kind. The herb crowfoot is also supposed to be an agent in its propagation. Foreign authors have likewise borne testimony to the acrimonious and poisonous properties of the ranunculiaciæ. The water hemlock also lies under this opprobrium, particularly the roots of the plant, but which, although poisonous to horses, are averred to be wholesome and even fattening to cattle. Of our own knowledge, we cannot affirm either one way or the other; but we do suspect that much disease is engendered by these promiscuous browsings, particularly among aquatic plants, or, at least, such as grow in the moist and splashy corners of lowland meadows. The æthusa cynapium, or wild parsley, is known to purge horses that have eaten it with great violence, and also to excoriate very extensively their lips and nose. See *Veterinarian*, vol. xii, p. 673. This cattle epidemic shews itself by an early loss of appetite, and inversion of the hair. However, in stating that a loss of appetite was an early symptom, we should have qualified our language by observing that, in many cases, we have seen, in the commencing periods of the attack, it was rather the soreness of the mouth than any disinclination to feed that occasioned the refusal. The feet also present a singular feature, inasmuch as they suffer as well as the mouth, by becoming ulcerated between the claws, and the same ulceration spreads over the soft parts of the foot as the coronet, &c. It is this soreness that inclines the beast to lie on the ground as much as possible; sometimes, indeed, so tender are the feet, that an unlucky step on a very hard surface will bring them down as though they were shot. So extensive is the disease in its attacks, that the udder is even affected, the teats being beset with pustules. Rumination is usually stopped, and very little milk is yielded. We judge that inflammatory action is going on within by the colour of the urine, the loss of the milk, and the darkened and hardened fæces which pass from the animal. However, in its early attack, it may put on the appearance of synocha, or mild fever: it usually passes on, and soon assumes that of synochus, which approximates to the typhoid state; and then it passes into a virulent form, bearing, more or less, septic or putrid characters, with its concomitants, as dulness, lessened appetite, and great prostration of strength.

As regards the treatment of this complaint: in its early stage, unload the bowels by some effective but not drastic purgative. To prevent the aggressions of the more morbid typhoid symptoms, and such as bespeak a truly putrid tendency, use all those remedies which are known as antiputrescents. The sweet spirits of nitre, with sound yeast worked from strong ale, is an excellent one: give also camphor in combination with the compound powder of ipecacuanha. We would likewise recommend the white antimonial powder to be superadded, if the pulse be hurried. It is with some cattle masters, we know, a custom to give salt dissolved in gruel as a very sanative treatment, and in very mild cases it may prove so.

CLASS II.

INFLAMMATION OF ORGANS ESSENTIAL TO LIFE.

BY this is meant those internal inflammations, which though local and confined, yet affect organs of such magnitude and importance, as to form themselves each into a peculiar and marked disease.

PHRENITIS, OR INFLAMMATION OF THE BRAIN IN HORSES.

Our neighbours, the French, who refine much, but probably in this case justly, have divided phrenitis of the veterinary catalogue into *arachnoidites* and *encephalitis**; but as it appears from various sources that they have not yet been able satisfactorily to define those features by which we are to distinguish the attack made on the envelopes of the brain from that which affects the cerebral mass, we may at present content ourselves with considering mad staggers as an inflammatory state of the brain generally. A division of it, of much more practical importance, presents itself; which is into *idiopathic* or primary, and *symptomatic* or secondary.

Idiopathic phrenitis has been popularly known by the names of *mad staggers*, *sleepy staggers*, and *phrensied fever*. The two former it was common to consider as distinct diseases; but morbid anatomy and a more extended field of observation have taught us that they are only modifications of the same affection, produced principally by the different stages of the complaint: occasionally also by the different degree of inflammatory action going on, and possibly by some variation in the irritability of the organ attacked. The *sleepy staggers* of farriers, and the *apoplexy* of some veterinarians[*], as an idiopathic affection[†], is usually but the first stage of phrenitis. It is true it does occasionally run its course, either fatal or otherwise, under this form, but it is much more frequently the precursor to another.

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* In my own opinion, if a distinction were at present to be entertained, it would be more proper to do so by the terms *meningitis* and *encephalitis*. Morbid anatomy does actually shew us that in some cases the meninges or envelopments of the organ are the principal seat of the complaint; and although an actual inflamed state of the *human* brain is denied by many, yet we certainly, in the horse, do occasionally observe a morbid alteration of its structure in his phrenitic cases. As regards the term arachnoidites, without doing more than glance at the strange contradiction of making it a secretory organ, and yet denying its vascularity; we may observe that the gorged state of the vessels of the pia mater and plexus choroides, which so frequently characterise this complaint, sufficiently, in my opinion, prove the priority of claim to rest with meningitis. If arachnoidites should ever find its way into our veterinary nosology, let it denote that phlegmasia which is followed by hydrocephalus. The following annotation of *Rodet, Professor of the Royal Veterinary School at Alfort*, on a case of phrenitis, published by M. Lessona, will present a fair summary of the continental opinions on the subject. 'Furious delirium, extreme agitation, convulsions and spasms, indicate, generally speaking, in these affections, that the membranes in particular, and above all the *arachnoid*, are the seat of the disease; whilst stupor, coma, collapse, lethargy, muscular debility, &c. belong more especially to those cases in which there is *alteration of the proper substance of the brain*. In the above case, the alternation of furious delirium and lethargy shewed, as was afterwards proved on dissection, that *the brain and its membranes* were both affected at one time, and that *encephalitis*, which preceded, became subsequently complicated with *arachnoiditis*, inasmuch as the symptoms of the latter did not make their appearance until after the manifestation of those of the former. And in respect to symptoms of agitation or collapse, the remarks already made are founded upon facts resulting from observation, and I repeat, that such symptoms no more belong to the acute than to the chronic form of disease; but that the former, viz. those of exaltation, denote that the *membranes* are affected: whereas those of annihilation of the functions of voluntary motion and sensation, on the other hand, proclaim the morbid alteration essentially to exist in the *substance of the brain itself*.'

The *premonitory symptoms* will vary as the attack is more or less acute, or as its approaches are slow or sudden: when slow, it is ushered in by a loss of the usual attention to objects around, and an accompanying drowsiness, which increases into lethargy; the appetite at first is rather interrupted than lost: when the attack is sudden, the horse is at once found with his head hanging between his legs, or rested in the manger, or forced against that or the walls of the stable; or if it occurs at grass, he is often found thus resting his head against a tree, or pacing around it; his eyelids are likewise partially closed, and when elevated, the pupil is seen dilated, and around it increased redness and vascularity of the conjunctive coats, as well as of the nasal membranes. Some costiveness is also present, and almost invariably the pulse is below its natural standard. The breathing is not in the early stage usually much affected; stertorous breathing only occurs in extreme cases. These lethargic appearances sometimes increase rapidly; the horse occasionally falling down, sleeping with food in his mouth, and when roused relapsing into stupor quickly until nervous excitement is totally suspended, and the animal dies in two, three, or four days, or may live to the sixth or seventh; or the disease may give way to a natural or to an artificial cure. The *post-mortem* appearances of such as die in this state or stage of the disease are principally confined to the cerebral membranes, which are usually turgid with blood throughout all their envelopments, the plexus choroides more particularly so; and it is remarkable there are few of these subjects in which some marks of visceral phlegmasiæ are not present likewise.

The *mad staggers* and *phrensy fever* of farriers occasionally makes its appearance without the former stage being prominent or observed; but in the majority of cases the lethargic state is followed by phrenitic symptoms of more intensity: the pulse rises, there is much watchfulness and irritability of manner, occasionally stamping of the feet, and a delirious look. The mouth is hot and dry; the pituitary and conjunctive membranes are much heightened in colour, and the breathing is greatly quickened: as the disease advances the pulse is full and frequent; sometimes it is peculiarly hard and irregular, scarcely remaining the same for an hour together: the horse bounds from side to side; delirious fits occur, which make it dangerous to approach him; the violent convulsions which suddenly seize him making it not uncommon for him to rear and strike out his fore feet with great violence; or he will sometimes in so doing fall backwards, in which state he will lie sweating at every pore, apparently with the intensity of the pain he suffers: small hard dung-balls are forced out at such times, or a small quantity of highly coloured and sometimes offensive urine is expelled, from which he may experience slight relief, and he will rise again to renew the same scenes, until exhausted by the irritation[‡].

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[*] As a simple accumulation of blood in the vessels of the head, and a consequent disturbance of the functions of the brain, it would be difficult to deny its claim to this term; but there are conventional meanings very properly attached to words, whose limits it would be otherwise not easy to confine; thus by apoplexy we usually understand a sudden attack of coma, and of one generally the consequence of direct rupture of the vessels of the brain by an accidental force applied. Under this view, *apoplexy* is even a more questionable term for staggers than *vertigo*, by which it was so long and so commonly known among the French veterinarians.

[†] The young practitioner must be careful to mark the lines of distinction between this and the symptomatic coma, produced by congestion of other organs, or between it and that brought on by mechanical distention of the alimentary canal; or by that produced by local injuries, particularly of such as have occasioned mechanical pressure of the hard parts of the head on the cerebral mass by blows, &c. His principal liability to error, however, will arise from confounding it with stomach staggers, but which it is hoped the full account to be given of that hereafter will prevent

[‡] Idiopathic phrenitis may, by the junior practitioner, be mistaken for the phrensied symptoms apparent in the rabid malady: but the following observations will sufficiently indicate the difference between the two. In the *rabid phrenitis* the symptoms evidently betoken, not only a frantic, but a decidedly *mischievous* disposition, which prompts him *purposely* to attack every thing living and dead: all around him suffers; rack, stall, and manger, are all laid prostrate. In the true staggers nothing of this kind appears; the horse is wild, and beats himself about, and endangers every thing around him, but not by premeditated design: on the contrary, he simply labours under spasmodic contraction of his muscles, which force him into violent efforts; he rears, plunges, falls prostrate, or kicks, from mere muscular irritation.

Post-mortem examination will not unfrequently present an altered structure in the cerebral mass itself. Mr. Percivall notices his having seen a remarkable yellowness of the substance of the cerebellum. Hurtrel d'Arboval has—'Le caractère anatomique principal qui appartient en propre à l'inflammation du cerveau, est le ramollissement (*a softening*) d'une partie de la substance déjà se peu consistant epar ell-même, de cet organe.' In some instances, particularly where death has early succeeded to a very violent attack, the cerebral pulp has been tinted with an inflammatory blush; the membranes, but particularly the plexus choroidea, have also been intensely vascular. In protracted cases, and particularly where serous effusion has taken place, the whole cerebral mass has been found more pale than natural, as well as soaked and tender also with serosity. *See four cases of staggers, by M. C. Lessona, veterinary professor at Turin, in Nos. 4 and 7 of The Veterinarian.* It is remarkable that in all these, as well as in very many other instances which have been examined, there has been visceral affection also.

The *causes* of phrenitis are varied and obscure; and this the more, as the morbid appearances occasionally are so connected with local visceral affection as greatly to bewilder our judgment. It may be produced by metastasis. A predisposition favourable to its attack is engendered by plethora suddenly attained. The late Mr. Percivall used to find the disease very prevalent in July, August, and September, among the troop horses, which were usually turned out in an emaciated state into the luxuriant salt marshes around Woolwich. Whatever determines blood to the head, as exposure to the heats of a mid-day sun without the means of shelter; violent exercise also, which, by congesting the chest, prevents the return of cerebral blood through the carotids. A singular cause we know to exist now and then in an inflammation of the Schneiderian membrane of the frontal sinuses, extending itself to the cerebral coverings. Tumours also within the substance of the brain, increased serous deposit within the lateral ventricles or the spinal canal, have all been known to produce it, as likewise accidental lesion.

The *prognosis* is favourable when the redness and flushing of the eyes decrease, when the horse becomes more tranquil, the pulse soft, uniform, and in proper number; when also the dung and urine appear in sufficient quantity, and symptoms of appetite return: but when the secretions continue small, the impatience increases, the teeth are heard to grate, and particularly if a sanious discharge issues from the nostrils, the termination will prove unfavourable.

The *cure of staggers.*—As this disease appears the consequence of an increased determination of blood to the brain, joined to an inflammatory state of its vessels; so it is evident that the cure should be first attempted by lessening the quantity of the blood generally, and on diminishing the increased action of the vessels of the part particularly. Both these indications are equally promoted by bleeding; and whenever this is done early, and the quantity abstracted is *large* and *suddenly* taken away, a rational hope may be entertained of arresting this rapid and too fatal complaint: proceed therefore immediately to draw off six, seven, or eight quarts, or even more, according to the age, size, and condition of the horse, and repeat it every two or three hours, in such quantities as the urgency of the symptoms and the state of the pulse indicate; for as long as that rises on the flow, so long it is salutary*. It will however be often found very difficult to draw blood in this complaint, from the furious impatient state of the animal: under these circumstances patience must be exercised, and the practitioner should not be deterred, but must wait the momentary cessations of the violence, when he may boldly open one or even both jugulars, and suffer the blood to flow until something like the above quantity may be supposed to have escaped. Should the violence of the horse prevent the application of a pin to the vein, no danger need be apprehended from suffering it to bleed as much as it will, particularly if one only be opened: on the contrary, when the quantity that will flow is not sufficient, a further encouragement ought to be given by a ligature passed round the neck. It has been strongly recommended, from very respectable authority, to bleed from the temporal artery in preference to the jugular vein; but although I can see no particular objection to it, if enough can be obtained, my own experience does not justify any such preference, but rather the contrary: some eminent French veterinarians practise revulsive bleedings from the feet, with, they say, great advantage. When it is impossible to accomplish bleeding by the jugular, the temporal artery may very properly be opened, as pointed at in *pl. 4, letter b*, and as further described page 138. In the living horse the artery may be detected between three and four inches below the root of the ear, in a line from its base towards the nostril. An opening of it should not however be made by dividing it across, for, if so done, the ends would probably retract under the skin by the muscular power in the vessel: but it should be operated on by puncturing it in the same manner as is practised on a vein, and it may be afterwards secured, if necessary, by division or ligature; but neither of which will often be requisite, for the first bleeding can hardly be too considerable: on the contrary, if it be even pushed until the horse be faint, it will be so much the better, and then the vessels will collapse as a matter of necessity.

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* If we could sufficiently distinguish such cases as were complicated with visceral phlegmasia of the thorax and abdomen, and particularly of such as were dependent on the inflammation of mucous surfaces, from those of pure idiopathic phrenitis; then we might in the latter case bleed without restriction almost; but in the former instances, however salutary an early and very full bleeding might be excellent practice, repeated abstractions might not prove so. It also becomes of the utmost consequence, not only to be able to satisfy ourselves on this point, but also to clearly distinguish between a prostration of strength resulting only from *interruption* of vital energy, and that brought on by a total failure in the means of its supplies.

Having bled the horse, the next indication will be to unload the bowels, preparatory to which back-rake, and throw up some cathartic mixture as a clyster; for the torpidity of bowels is usually such that it will be most difficult to move them; but that once thoroughly done, great hope may be entertained. By the mouth endeavour to introduce a liquid purge, as more speedy in its action; as a strong solution of aloes (see *Cathartics*), or croton seed in powder a scruple; either of which may be repeated in diminished doses, at first every four and afterwards at intervals of every six hours. At the same time may be exhibited also any of those remedies on which we rely for diminishing the force of the circulation generally, as digitalis and tartarised antimony; one drachm of the former, and two drachms of the latter every four hours. Volpi recommends digitalis and nitre. It becomes next a question what counter-irritants are proper: the head has been blistered, and I used to retain the blister there by means of a pitched cap, lined with the blistering plaster; but I confess I should, *in this case*, now prefer to remove my counter-irritants further from the immediate seat of the disease; and to stimulate the throat, breast, and fore extremities in preference. Ice to the head is a most difficult application to retain, but cold water can be dashed over it, and a current of cold air may be directed towards it. Rowelling and setons, unless made to act immediately, offer but feeble aids; but they may be employed provided they do not supersede more active means. There will probably be little necessity to offer any caution with regard to food in this complaint, for in aggravated cases there is little appetite; if, however, from a false sympathy, the horse should be inclined to eat, it should not be encouraged. Mastication is unfavourable to the return of blood from the head: a full stomach is equally so; not to add, that the collapse occasioned by fasting would be particularly salutary here. When the delirium and frantic symptoms are very great, it might be attempted to sling the horse, as is done on board ships, which would effectually secure him from injuring himself, and render him more approachable by the operator. It can hardly be necessary to hint, that the stable should be kept as cool as possible by means of a free current of air through it. When amendment does occur, it is necessary for the practitioner to bear in mind that he must use every prudent means to guard against a recurrence of the complaint, which is very usual, as well also that it is apt to leave congestion and chronic disease of some organ. Chronic hydrocephalus and amaurosis are also not unfrequent sequelæ of this affection.

Oxen and sheep are occasionally objects of phrenitic attack, which is called by graziers, farmers, &c. as in horses, *fever of the brain*, *phrensy*, *staggers*, &c., in which there is little difference in appearance, consequence, or necessary treatment. It is however to be noticed, that idiopathic staggers in them, particularly in cattle, is much less frequently observed than symptomatic staggers, dependent on acute attacks on some of the thoracic or abdominal viscera.

SYMPTOMATIC PHRENITIS[*].

Symptomatic or *secondary staggers* may exist under several forms, according as the original seat of the disease may be diversified; it being understood, that in this case the phrenitic type is not derived from a primary attack on the brain, but on a local one of some other organ; usually on one or more of the contents of the chest or belly, or both. And if, according to the present prevailing theories, inflammation be principally dependent on a connexion between the nervous and sanguiferous systems (see *Angiology*, p. 127), then our experience that nervous agencies may be transmitted as well from the organs to the brain, as from the brain to the organs, explains to us many appearances at present very obscure, and opens a new and wide field for our research, and an enlarged sphere for our curative exertions. It will also lead us into a conviction of the propriety of further division of *symptomatic phrenitis* under the view detailed in the note; particularly of preserving a distinct niche for that variety known as stomach staggers with us, and vertiginous indigestion among the French. The subject is important and interesting, but my confined limits will not admit of more detail than is embodied in the note: I would, however, strongly recommend it to the student's notice as he finds it in the works of Gilbert, Dupuy, Volpi, the French periodical journals, and the Dictionary of Hurtrel d'Arboval. My present inquiries will be directed to *symptomatic staggers* generally, and to the theory of *stomach staggers* as connected with it particularly; but which latter I shall again notice hereafter as *mechanical distention.*

Encéphalite secondaire, *meningo-gastrique*, *vertige abdominal*, and *indigestion vertigineuse*, are names by which this particular *symptomatic phrenitis* is known among the French, which was with them, as with our older writers, attributed to a primary attack on the head; and it remained for Gilbert among them[†], and for the acuteness of Mr. Coleman with us, to point out its true seat and origin. Mr. C. has expressively named it stomach staggers, by which, as well as by his reasoning, we learn that he considers it as a state of acute indigestion. My opinion coincides with that of Mr. Coleman, that acute indigestion is present in many instances, and that to it the *intensity of the phrenitic symptoms*, in most cases, owes its existence; but I also believe that there are many other cases (where somnolency but not phrensy is principally present) which are not altogether *gastric*, nor *primarily* dependent on *mechanical distention*. It is, on the contrary, in some instances an inflammatory attack on the mucous surfaces of both the stomach and bowels, and is frequently also complicated with biliary affection; in such cases constituting hepatic gastritis[*]. This view of it does nothing to lessen Mr. Coleman's claim to having first drawn our attention to it; nor to the justness of his opinion of the existence of the disease in one of its prominent forms, and that which the early state of the art among us was most likely to be seized on as the type of the whole. I have heretofore stated that I considered the basis of the disease founded on a *specific inflammation* of the stomach. I am still of opinion that the phlegmasiæ observed does not own the common characters of either local or diffused inflammation. But further inquiry has taught me that its seat is not confined to the stomach only, but that it is sometimes extended to other of the abdominal viscera also.

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[*] In substituting the term *symptomatic phrenitis* for that of *specific inflammation of the stomach*, which appeared in former editions, I have been influenced by a conviction that the specification of any local seat for this disease exhibited too confined a view of the subject; for the united testimonies which have been, and yet remain to be given, will render it apparent that this is not always an affection of the stomach, characterized by symptoms of cerebral affection, but is extended to other viscera also, whose derangements are now observed to be equally capable of affecting the sensorium with symptomatic coma or phrensy. My opinion of the immediate *nature* of the inflammation itself remains the same; but after much deliberation, my view of its localities being much extended, it becomes necessary to use such a term as did not take a *part* for the *whole*, but was in itself comprehensive. The change, however, cannot even now be advocated as one of strict nosological accuracy; it is only a choice of evils, in which our present ignorance of the subject forces us to an accordance with our French neighbours, who have so long noticed and so largely treated on it, but who appear to me to set an example of error before us, when they unite the description of symptomatic cerebral affection produced by mere distention (whatever its ultimate effects may be) under the same head with acute and direct attacks of phlegmasiæ, not of one, but of different viscera; and I enter my protest against this palpable breach of system, although in so doing I publish my own delinquency. In the last edition I placed the affection to which I am now principally directing my attention (stomach staggers) in *Class V*, as *Acute Indigestion*; and in my opinion that is the most proper place for it; but as its symptoms are nearly allied to, and many points in the curative practice of it are the same with the inflammatory affections hinted at, which alone ought, in strict nosological arrangement, to be entertained here; so I continue an error, forced on me as well by the example of previous authors, as by my own confined limits. On the immediate nature of the phlegmasiæ which ought to form the principal and in fact only part of my *present* inquiry, I entertain the same opinion I have ever done; and if I concede the term specific inflammation to the fashion of the day, or to its hacknied sound, I am even more than ever convinced that the visceral phlegmasiæ which are accompanied with either phrensy or lethargy, as pathognomonic symptoms, do not own the *common characters of inflammation*, usually recognized among us as such; but that they deviate from the ordinary course, *in not being necessarily combined with cerebral affection*, by which, therefore, a *specific* difference is occasioned, and a *specific disease* is formed. I have before asked, are either gastritis, enteritis, or hepatitis, as visceral inflammation, marked with great *cerebral disturbance?* if not, then there must be some speciality between them and these *phlegmasiæ*, which are invariably so marked.

[†] Avant la publication, en Vendemiaire an 4 (Octobre 1795), du traité de Gilbert sur l'indigestion vertigineuse on ne croyait pas que la lésion primitive d'où l'encéphalite émane pût avoir son siége ailleurs que dans les organes cérébraux. Gilbert changea à cet égard la plupart des idées; les autopsies cadavériques lui démontrèrent que les principales altérations pathologiques occasionées

The causes are various, but that to which it is generally attributed, and to which it can be frequently distinctly traced, is, that of mechanical distention of the stomach, and more particularly of one in a state of atony, either by long fasting[†], or in that which has become habitually so from age[‡], bad condition, or repeated lesser attacks of indigestion[§]. It appears also to be brought on by injudicious turning out a stable-fed horse into a field with hoar frost on it[‖], as well also by the nature and quality of the herbage they meet with[¶], an instance of which I met

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par la maladie se trouvaient dans les organes digestifs, et il en conclut trop exclusivement que le vertige n'était, dans ce cas, que secondaire ou symptomatique, qu'une indigestion prolongée en était la première cause. Il nomma cette variété *vertige abdominal* ou *indigestion vertigineuse*, et il alla jusqu'à mettre en question l'existence, la réalité d'un vertige autre qui celui qu'il désigne ainsi, celui dont nous avons traité sous le nom d'encéphalite primitive.

[*] Il nous serait facile d'établir que l'encéphalite secondaire ne dépend toujours de l'inflammation de la membrane muqueuse gastrique, et de faire voir que le même effet peut être produit par des phlegmasies aiguës de vesières de la pectrine, &c.

[†] Accidental circumstances will sometimes force a horse to fast for many hours; the stomach has also perhaps lost its energy, not only from inanition, but fatigue also. Suddenly he finds before him grass, hay, or corn, particularly when bran is mixed with it, or forms a principal part of the meal. 'Le son' (bran) 'est de tous des alimens celui qui produit le plus souvent cet accident.'—Huzard. Of this many examples occur with us also, the dry and indigestible nature of this cortical part of the farina rendering it particularly fitted for this injurious purpose: eating voraciously, and without due insalivation, as the hungry horse will be apt to do, of food which requires little mastication.

[‡] Mr. White observes, that it usually attacks old, weak, and hard-worked horses. M. Berger Perriere informs us, that in the neighbourhood of Bourgoin, where the inhabitants are very poor, and their horses very irregularly fed, this disease is very common. They work the whole of a long day without any food, and even then are shut up some time to rest, when they are removed for a few hours to graze; and as their experience informs them that they shall soon be again called for, they swallow quickly all they can browse.—*Recueil de Med. Vet.*

[§] Ce n'est jamais une première, une seule indigestion, dans un cheval d'ailleurs bien portant, qui peut occasioner chez lui l'encéphalite secondaire, mais bien plusieurs indigestions qui se succédant a courts intervalles, et dont le devellopement successif favorisé par une certain prédisposition de l'éstomac, qui, long-temps avant que ces troubles aient lieu, est tombe dans un état tel, que ses fonctions ne fout plus avec-la même régularité —*Dict. Vet. Hurt. d'Arboval. art. Vertige.* We are led by what precedes, not to understand that horses are never summarily attacked with acute indigestion, but that horses either in a total state of inactivity, or otherwise inordinately worked, but being usually fed with massive mixtures of the hull or chaff of the farinaceous seeds, or from hay and straw chaff, which require much power to extract even a small share of nutriment from, are peculiarly liable, from a slight occasional cause only, to fall into this state, and the truth of which I can bear testimony to.

[‖] In the department of L'Isère 'the abdominal vertigo' is very prevalent; and it is observed that it is most so when the ground is covered with hoar frost, from whence it is common to call it the hoar frost colic. As is well known, out-door feeding is little practised on the continent; grasses are mostly cut and taken to the animals, and they are most of them cattle and stall-fed. It therefore happens that when they are turned out to eat the refuse during the autumn or winter, as it is usually for a few hours only, very early or very late, they must encounter the hoar-frosted grass, which, not being sufficiently and gradually accustomed to, produces an atonic state of the digestive organs; and instead of healthy digestion, fermentation begins to take place. It is said there to occur in the ass and mule also, which is very unusual with us.

[¶] The soiling of horses in the stable must be very liable to produce it, from the avidity with which they eat, and from the readiness of grass to run into a fermentative state, when not at once stopped by the process of assimilation, whether such be delayed by the state or quality of the vegetable matter, or with some time since. There are reasons for supposing that the forms I have hinted at as not traceable to distention as a cause, although they sometimes accompany it, are occasionally found endemial, epizootic, and even contagious[*].

The characters of symptomatic phrenitis, as frequently first observed, are slightly lethargic; the horse dozes, takes little notice of any thing around him; and when distention, if such be the cause, is not yet considerable, he will be found often eating slowly, alternately masticating and dozing. As the disease proceeds, and the head becomes congested, either by accumulated matters in the stomach, or by a morbid translation of disease to the brain, the coma produced inclines the horse to press his head against any fixed object, or to rest it in the manger, or hang it between his legs; occasionally it is elevated and placed between the rack-staves. If it occurs to a horse at grass, he is either found this way resting his head against a tree, stupidly fixed to one spot, or otherwise is employed with feeble step tracing one determined line, be it backward, forward, or circularly. The breathing in the early stage is not materially disturbed. As it proceeds, it first becomes low and rather protracted; and when the symptomatic attack on the membranes of the brain has produced phrenitic symptoms, it then becomes more hurried than natural.

The pulse also varies in different cases. I have observed it very early oppressed and at other times quickened, particularly when the pain from distention has been acute, and also when active inflammatory cerebral affection has come on: but, except under these circumstances, the coma keeps down the pulse, which often remains to the last considerably under the natural standard; and as the disease increases in intensity it sometimes intermits. Until visceral inflammation is established, or until a mechanical distention is considerable, the complaint is not intensely painful, but under these circumstances it becomes so: the horse then is seen looking round at his flanks, stamping with his feet, hanging back on his collar, lying down and quickly rising again; occasionally he rolls. To these are superadded more violent symptoms in those cases where the sympathetic irritation injects the membranes of the brain highly, when all the frantic scenes noticed in idiophatic phrenitis are witnessed. The greater number of cases, however, occasioned by mechanical distention, are more marked with apoplectic than phrenitic symptoms; and here, instead of an excess of nervous excitement, there is altogether a want of it, and great debility is often present. Spasmodic twitchings of the cutaneous muscles are not uncommon; and in such cases as have acknowledged an extended phlegmasiæ as a part of the affection, biliary suffusion takes place, and the mucous membranous surfaces of the eyes, nose, and mouth, present a yellow tinge. Under these symptoms, unless relief is promptly obtained, either the vital energy becomes so totally suspended that the animal drops to rise no more; or the distention ruptures the stomach, or it produces such congestion that he sinks apoplectic, or otherwise is worn out by the violence of that phrensy which results from the disease taking on the form of meningitis. Every case is not, however, of necessity fatal, although, when I wrote a former edition of this work, I had in own my practice met with no fortunate termination, but since that period the knowledge of several has reached me; these, however, compared with those which end fatally, are yet sufficiently rare.

Post-mortem examination.—The appearances of subjects which have died of

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by some want of power in the digesting organ. It must, from what is stated above, be evident that the continental stall-feeding must make it peculiarly prevalent there, as it really is. L'Encéphalite secondaire reconnait un grand nombre de causes, dont les principales sont: les suraboudances d'alimens après de longues privations; l'usage des fourrages excitans, des fourrages nouvellement récoltés qui n'ont pas encore *jete leur feu*, qui sont disposés à la fermentation ou déjà avaries; l'usage du brêfle mal récolté, de la luzerne engrangée trop tôt, du foin poudieux; celui des feuilles de vigne, d'if, des bourgeons du jeune bois, de l'avoine trop nouvelle, ou qui a germé, ou qu'on a humectée uncertain temps d'avance pour la faire goufler et en augmenter le poids.

[*] In the neighbourhood of Swansea, Mr. White informs us, it has existed in somewhat of an endemial as well as epidemic form, and one season proved fatal in seventy-six cases out of eighty. It was most prevalent between July and September. It attacked all ages, both sexes, in stable or at grass, or underground in mines, all were equally obnoxious to it; and moreover it was very generally considered contagious. 'On dit cette affection très commune en certaines années dans les animaux monodactyles, et particulièrement chez le cheval, surtout dans nos départemens de l'est, de la Manche, de la Meuse, de la Moselle, des Ardennes et dans la Beauce.' Numerous other continental notices have appeared, which tend to exhibit its epizootic and contagious characters.

symptomatic phrenitis in its extended sense, usually exhibit traces of inflammatory action in the abdominal viscera, and less frequently marks of the same kind are seen in the thoracic cavity, particularly throughout the aortic system generally. In the head, be it purely sympathetic, or be it idiopathic by translation, there is increased vascularity of the meninges of the brain, and occasionally of the medullary matter itself. In the true stomach staggers, in addition to more or less of these appearances, there is usually found a vast quantity of hardened undigested matter in the stomach*, whose mucous membrane, particularly towards the pyloric extremity, is studded with inflammatory streaks, which sometimes extend into the duodenum, as the hardened and undigested matter is sometimes found lodged in the large intestines, which then also participate in the inflammation. The quantity of gas let loose is sometimes great, particularly when the *hoving* has been occasioned by green food: and though much of that which has escaped during life is often reabsorbed after death, yet sufficient always remains to attest the distress which must have been felt from the tympanites. Occasionally there are marks of peritonitis, and sometimes serous effusion has taken place; but such appearances usually accompany the mixed cases already hinted at. In many instances some traces of hepatic inflammation are present, from whence occurs the biliary tinge noticed in the symptomatology.

The *Prognosis* is seldom favourable, but, when dependent on acute indigestion, our extended researches may probably hereafter afford us some means of *mechanically* removing the obstructing mass. The cases in which the disease advances to its intensity in a regular and unbroken course are seldom otherwise than fatal; but if called in sufficiently early, so that the obstinate costiveness can be removed, and a passage be opened for the gastric contents, by which the tone of the stomach can be regained, and the head relieved from its plethora, a fortunate termination may be expected.

The *Treatment* of symptomatic phrenitis ought to be undertaken promptly, but not until a careful inquiry has been made into the true seat of the disease, its nature, and the length to which it has proceeded. Is it really secondary? is a question of much moment, but extremely difficult often to answer; and again,—If secondary, is it truly a case of acute indigestion? Fortunately, circumstances here will much assist us: has the horse previously fasted long, and has he had a superabundant quantity of food set before him? Has he been exposed to singular privation, or has he been newly turned into pasturage of clover, sainfoin, or other artificial grasses, or been soiled with such in the stable†? If none of these causes appear, *is it simple visceral phlegmasiæ?* If it is so, then bleeding must be determined on, and counter-irritants applied in the neighbourhood of the parts affected, proceeding to unload the bowels manually only; for should the alimentary canal be the object of phlegmasia, and not of simple distention, then active purgatives ought to be avoided: in all other respects follow the course directed under Diffused Inflammation. But, on the contrary, if there be reason to conclude that acute indigestion is the cause, are we to endeavour to remove the cause, or are we to combat the effects? which of themselves are sufficient to lay the strongest constitution prostrate. If we were called in to a horse already delirious and frantic, we should not hesitate to commence our treatment by bleeding largely; but if there was a mild lethargy only, with a subdued pulse, soft, slow, and but little vibratory, and particularly if the vital powers were ebbing fast, we should, as a preliminary step, endeavour to prevent further distention by the generation of gas from the stomachic or abdominal contents, and which indication we should more particularly follow if the distention had been occasioned by green meat. Vinegar has been found useful for this purpose, and other means to this end may be seen under *Hoven, Class V.* If dry food has been the cause, it will be prudent rather to attempt to stimulate the organ to contract on its contents, or by promoting a healthy digestion to dissolve them, as aloes ʒiij, pimento ʒij, ol. terebinth. ℥ij, ammoniæ subcarbonatis liquor (spirit of hartshorn) ℥i. Infuse the aloes and pepper, after finely powdering them, in half a pint of ginger tea, and give. Repeat it also in an hour's time, if no relief is obtained. Mons. Gilbert prescribes the supertartrate of potash (*cream of tartar*)—quantity not mentioned—with 'emetic antimony' ℥ss. During the operation of these stimulants, let the body be very briskly rubbed by two or three sturdy attendants, which will aid the flagging powers, and may prove a revulsive process, from the cerebral affection; and having done this, further stimulate the breast, sides, &c. with a terebinthinate tincture of cantharides (*sweating blister*). In such cases as are known to originate from bran, pollard, barley meal, or chaff, taken in large quantities, the injecting syringe offers much hope, by introducing a sufficient quantity of liquid matter to float the impacted and hardened mass, by which it may pass off at the pyloric extremity; and as an instance has been known of a vast quantity of grains having been returned by vomition, it might at least be worth the trial again to produce the same by filling the stomach with fluid. There is little fear of doing more mischief; if the mass be suffered to remain, death must ensue; therefore even desperate remedies may be tried with propriety. Neither is it altogether hopeless, after the distending aliments have been rendered fluid, that they may be removed by means of the stomach pump, now made by Read, Weiss, &c. purposely for the use of the veterinarian. It has already been partially used with success, and promises, I think, much more, as skill and experience become employed in the use of it. No veterinarian should be without it, nor should any case of this kind, that had resisted two or three hours' other active treatment, be suffered to pass without its being used. It remains to observe, that when a remission of the symptoms has been obtained, the care and attention must not relax. Health seldom becomes quickly established; but atony and vitiated digestion, with all the symptoms of want of condition, hang about the horse some time, and amaurosis has also been remarked as one of the sequelæ of this affection, by the morbid effects it has left on the sensorium; which is an additional reason why the practitioner should be prompt in his attempts to relieve the symptomatic part of the complaint connected with disturbance of the cerebral function by the methods noted under the idiopathic phrenitis.

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* The quantity that has been taken from the stomach of horses after death is immense for the apparent size of the organ. Mr. Percivall mentions upwards of thirty pounds weight in one case. I have myself seen near twenty pounds abstracted. Hurtrel d'Arboval informs us, 'On a même vu l'estomac d'un cheval mort de l'affection qui nous occupe peser vingt-six kilogrammes ou cinquante-quatre livres. La membrane muqueuse de l'estomac offre des traces de l'irritation dont elle été le siége. Le gros intestine contient aussi des matières alimentaires mal digérés; on remarque parfois des traces de phlogose au pylore et dans tons toute l'entendue de la membrane muqueuse intestinal, sur du gros intestine.'

† When it so happens, that although our suspicions are raised that true stomach staggers is present from distention, but no fact of this kind can be gained to assure us of it, we must in such cases trust to the few distinguishing marks that offer themselves. In this complaint it is seldom (at least in the early stage) that the conjunctive, pituitary, and buccal membranes are reddened, although they have sometimes a biliary tinge: in idiopathic phrenitis, on the contrary, they are in most cases highly injected. In the staggers of distention there is usually some tympanitis; in the idiopathic there is none; and from enteritis proper, it may be distinguished by the symptoms of coma so usually present with it; and the absence of heat and tenderness in the abdominal region, so characteristic of the other, will of itself assist the decision.

INFLAMMATION OF THE LUNGS.

Peripneumony, or inflammation of the lungs generally, was long a great stumbling-block to the practitioners of the old school; the devastating effects on these organs, seen in such as had died of it, being usually mistaken for the effects of some chronic affection of a *rotting* tendency. A more extended acquaintance with the art has not only taught us the true nature and progress of the disease, but it appears also to have produced a conviction in the minds of many veterinarians who wavered on the subject, that pleurisy, independent and distinct from pneumonia, may and occasionally does exist in the horse; and that therefore, in a systematic point of view, it is proper to consider it under the distinct heads of *pneumonia* and *pleuritis*, to which also I would add that of *pneumo-pleuritis*, as no one will deny that the character this implies is by far the most usual form of the disease*; and he who is fortunate enough to treat this successfully may leave the other two to his neighbours.

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* When the third edition of the VETERINARY OUTLINES was in progress, this subject was a dis-

Pneumonia, or *inflammation of the substance of the lungs.* Under this I shall treat in detail on the causes, symptoms, and cure, as a type applicable to the three varieties; and premise the account by observing, that when we consider how totally we have removed the horse from a life of nature to one of art, in which the lungs, although more important than most, and certainly more vascular than any other organs, are subjected in an extraordinary degree to the extremes of exertion and temperature, we cannot be surprised that they should in a greater degree form the seat of acute inflammation.

Causes.—The *predisposing* may be looked for in constitutional plethora, occasioned by high feeding, hot clothing, stabling with high temperatures*, and constant accelerated exercise, all which render the lungs more susceptible to congestion, and less able to resist the effects of it. The *proximate* are numerous; among them *alternations* between heat and cold are probably the most common; and we have more reason to believe that it is the alternations themselves, as we find that horses bear the extremes of both heat and cold†, by their geographical distribution, with equal impunity. Under this view we are led to conclude, as well by reason as by fact, that the alternations being the active agents, the injurious consequences are likely to result from either change‡. Heat suddenly

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puted one among us; and though our neighbours the French, in their love of division, had drawn two distinct portraits of pneumonic inflammation, yet such distinction was by no means fully recognized here, although, yielding to authority, it was not altogether denied. Mr. Percivall, at the same time that he appeared inclined to admit the existence of genuine pleurisy in the horse, yet observed, 'I know of no difference in the symptomatology of pleurisy and peripneumony.' A reference to the third edition of my work will shew that I there observed on the growing opinion; and that I had myself seen among the numerous subjects destroyed by pneumonia, which some seasons brings before us at the knackers, some in whom the inflammatory marks were greater in the substance of the lungs, and others where the membranes were most affected; but I there stated, what a still more extensive experience than I then had has further convinced me of, that the number of cases marked by pleuritis, separate from pneumonia, and *vice versâ*, are very few. And now, not only would my reliance on the accounts of well-informed veterinarians on the subject fully satisfy me of the existence of the two affections in distinct forms, but I have certainly, myself, also seen them so exist. It was not, however, my acuteness to the symptoms as they existed in the living subject which taught me this, but the post-mortem appearances; for the symptomatology was equivocal, and though I do not deny, but on the contrary believe, that some distinctive marks during life do occur, yet that they are obscure, and can be seldom defined with certainty. The practitioner, however, need not fear to do much mischief, provided he pursues the beaten track, for the proper treatment of both is the same, or does not materially differ in any essential particulars. We are too apt to think meanly of the acuteness of observation in the older authors, and we therefore ridicule their statements, but how frequently we afterwards adopt them! The antient farriers, both in England and on the continent, described pleurisy in the horse, which later authors denied, less probably, however, from direct observation than a suspicion that the older opinion was rather analogically than inductively formed. It is now proved, that, in this instance, a parallel drawn from the pathology of the human subject has not erred.

* In winter the hunter lives 23 out of 24 hours of every non-hunting day in a temperature 20 or 25 degrees beyond the natural temperature of the atmosphere: the racer frequently passes whole weeks thus, in one even 30 degrees beyond it.

† I beg it to be understood I use the term *cold* here in its popular sense, as a negation to heat: abstractedly *cold* is nothing positive; but we become sensible of a rapid transit of heat, and we call the sensation produced by it *cold*.

‡ Mr. Coleman is of opinion that the application of cold, even suddenly applied, is never productive of this disease; and that although turning horses to grass without preparation may emaciate them, it will never produce pneumonia; but, on the contrary, that most young horses first taken from grass and stabled, are attacked with pneumonic symptoms more or less. The ingenuity of Mr. Coleman's arguments usually carries conviction with them, and his opinions are in general well based; but we must be careful in this instance from adopting them in toto. It must be acknowledged that the removal of a horse from an *habitual* cold temperature to a warmer will very frequently produce inflammation in some of the air passages; but it is the *sudden alternation* that does it, and not the *habitual* residence in either the one or the other. All who are accustomed to observe the sale of horses, must be aware that it is seldom that one can be bought out of a dealer's stable and removed to that of the purchaser, although probably a very good and well-managed one, without contracting a cold. Here it is neither the application of a material quantity of either heat or cold, but the sudden exposure to a small variation only. That the sudden application of cold is an equal, if not a more efficient agent in producing pneumonia, I think we have many proofs. We know the vast sympathy and parity of action between the skin and lungs as exhalents of fæcal matter from the blood. See *anatomy and physiology of these organs.* Can we therefore suppose, that when the skin is in full action to pass off the serous exhalation by which the superabundant heat is to be kept down and the lungs relieved, that a sudden application of cold, which immediately throws on these important organs, now particularly susceptible by exercise or the rarefaction of the air, the additional burthen of the office of the skin;—can we suppose, I repeat, that this can be done with impunity? We know it cannot from the experience of every day. Cold showery weather, with wind, are well known excitants of this disease, because the increased evaporation occasioned by the breeze on a wet surface abstracts the heat rapidly. The London knackers always expect a glut of dead pneumonic horses in sharp frosts. The fox-hunter can witness how frequently swimming across a river in the ardour of the chace is followed by inflamed lungs. In many such cases an immediate rigor follows the

applied may be supposed to heighten the circulation *generally*, and produce congestion *immediately* within the lungs. Cold suddenly applied may irritate the bronchial aërating vessels; or it may act on them by disturbing the functions of the skin. In both these ways, drinking cold water when the body is hot may produce it. A very fertile source of it is also occasioned by inordinate exercise, either as regards its quickness of progression or the continuance of it; thus it frequently follows severe runs in hunting, and thus also horned cattle are liable to it, who, in a high state of condition, travel great distances to markets or fairs. A cause which partakes both of the nature of predisposing and proximate, is observed to particularly operate in some seasons: cold moist springs are often marked with pneumonic attacks, which rage in an epidemic or epizootic form.

Symptoms.—This disease sometimes attacks the horse very suddenly, and he exhibits, after one or two shivering fits, all the intensity of the complaint; at others, it steals on, and is almost unobserved for two or three days; but whether the approach be sudden or retarded, the general functions will appear disturbed. One that first shews itself is the unequal distribution of heat, the legs and ears being much colder than the body. The coat stares, the horse loses his appetite, his lively air, and is evidently uneasy, and occasionally looks gently round towards his flank. In the early stages the nasal linings look paler than usual frequently; but as it advances they become of a pink-like hue, and although the general surface of the trunk may vary in its temperature, the extremities, as the legs, ears, and tail, and sometimes the muzzle, will be found uniformly cold, often intensely so. Cough is by no means a pathognomonic symptom; many cases are without it, but when it does exist, it is at first short, dry, and frequent, but becomes eventually heavy, thick, and painful, and occasionally some mucus with bloody striæ is thrown up in coughing, particularly when the bronchiæ participate in the affection. The respiration becomes disturbed as soon as the disease is formed; the first febrile attack will hurry it, but, the exacerbation of that over, it returns to its natural state. The local inflammation having pervaded the parenchymatous substance and lessened the caliber of the air cells, respiration now becomes permanently quickened, the flanks are found to heave, and the breathing is carried on with labour and irregularity; the inspirations being delayed to retard the pain produced by the distention of the chest, while the expirations are more hurried to relieve the thorax from the distress. The cavity is, however, no sooner emptied, than a new source of distress in the congested state of the heart forces the horse to renew the effort. The state of the pulse is variable in this disease, according as the parenchyma or the reflected membranes bear the greatest share in the complaint, or as the thoracic cavities are unequally inflamed. It is, however, almost always quickened, sometimes to 100 even, from the irritative state of the aortic system; it is also in most well-marked cases small and oppressed, the pulmonary congestion preventing the free passage of blood through the right side of the heart. I have, however, occasionally found it moderately full and bounding, dependent probably on the membranous attack being greater than the parenchymatous. The horse is now seen to look more anxiously round to his sides, the whole body also seems stiff and sore: particularly elevating the head occasions great pain, and he is altogether disinclined to move; on the contrary, he stands fixed with his head extended forwards, his nostrils outstretched, his fore legs[*] somewhat apart and forward, and he seldom if ever lies down, or if he does,

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exit from the water, from which the unfortunate animal cannot be equably and universally warmed any more; *here, at least, heat cannot have supervened on the attack of cold.* Mr. Coleman has rendered an essential service to the army, and almost got rid of the liability in cavalry stables to this disease, by introducing a thorough ventilation. The favourers of the impunity of cold consider they have here a proof of it, as well as those who consider impure air as an excitant; but my own opinion is that the change is beneficial, not in the removal of heat so much as in the lessening of the liability to extensive alternations of temperature. In my own experience, the impurity of the air in stables, although it may generate glanders and other malignant affections, will never produce topical inflammation of the lungs.

[*] The disinclination to lie down is a peculiar feature in the complaint, and strongly serves to characterise it; being occasioned as well by a fear of strangulation from the prone situation, as to gain an additional power to expand the clogged chest by means of the assistant respiratory muscles of the fore extremities, which he spreads wide apart as fixed points, to enlarge the arch of the ribs which hangs between them; for in these cases the sensibility of the thoracic linings prevents the neces-

he rises again quickly. The chest, if tapped with the hand, emits a dead sound, while the stethescope applied will give a dull but heightened rumbling, and by this may be gained whether the intensity of disease is equal on both sides. As the complaint increases, the pulse becomes still more oppressed and irregular, so as to present, at the region of the heart, nothing but the faintest flutter; the legs, ears, and muzzle, feel still more intensely cold, although partial sweats may visit the carcass. The nostrils change to a still more livid hue, and the air they expire is cold. The mouth now becomes cold and pale; convulsive twitchings affect the breast, neck, and face; the teeth grate, and death ensues earlier or later, as the disease has been more or less rapid: occurring sometimes as early as the second or third day, but more often between that and the seventh, and being sometimes prolonged to the fourteenth or fifteenth.

The *terminations* of pneumonia are more varied than in most other complaints: *resolution* is that most to be desired, in which the symptoms gradually subside, either spontaneously, or aided by the curative treatment, the texture of the lungs returning to their cellular structure. *Congestion* is the termination most to be dreaded, and which sometimes suffocates the patient on the fourth or fifth day, by filling up the air cells with grumous blood. In the epidemic pneumonia, where a considerable degree of malignance is occasionally present, instead of blood, the air cells often become choaked with serosity. *Hydrothorax*, or serous effusion within the cavities of the pleura, is another fatal termination, and is either acute and rapid, or more protracted. In the former it occurs from the third to the fourteenth day; the exhalent vessels of the pleuræ begin their serous secretion, which they continue to pour out until they completely fill one or both thoracic cavities, and the animal dies from suffocation. This termination is usually betokened before death by a yellow serous discharge from the nose, without fœtor, and may always be detected by the stethescope: the pulse in these cases is irregular, but the general symptoms are so little intense as frequently to deceive the practitioner. The *less acute hydrothorax* frequently does not occur until the third or fourth week, and sometimes even a longer period from the pneumonic attack, and is even more deceptive than the other, for it seldom commences until there has been for a considerable time, perhaps two or three weeks, a perfect apparent remission of all the inflammatory symptoms, and it is only by an examination with the stethescope, or the critical eye and fine touch of the experienced observer, that any remaining disease can be detected. To such a one the disposition to effusion will manifest itself; the pulse will give a peculiar vibratory stroke, with some hurried irregularity; and as soon as only a moderate portion of fluid is collected, this peculiar state of the aortic system may be more distinctly felt by means of the hand applied to the region of the heart, which will then evidently convey the sensation of a pulsatory stroke through a watery medium. A smart rap also given by an assistant on one side of the chest will produce to a hand of the observer, held on the other, an undulation similar to that received from a tap given to a bladder filled with water; and if the like experiment be at the same time made on the sides of a healthy subject, a still more satisfactory proof may be obtained; which double examination should more particularly be put into practice where the stethescope is applied to assist the examination by percussion. (See *Stethescope*, *Mat. Med.*) The hydrothoracic state of the chest may be also suspected from the staring look and harsh feel of the hair, as well as from a yellow serous discharge from the nostrils usually present, at first thin, but afterwards thicker and glutinous. Any sudden exertion also alarms such a horse; he avoids turning, and resists holding his head up from fear of strangulation, by altering the direct course of the trachea. In this state he will continue, without much variation, to eat and perform the functions of a horse slowly recovering from a serious illness, and will thereby deceive his attendants: at length, however, he will be suddenly seized with renewed pneumonic symp-

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sary expansion by the usual agencies of the diaphragm and intercostal muscles, while the congested lungs receiving but little air, and acting but imperfectly on that little, endeavour to remedy the defect by an increase in the quickness of their action. The deteriorated blood likewise not being sufficiently oxygenated, stains the nostrils with a purple hue, and the obstruction to its circulation keeps the extremities in a state of deadly coldness.

toms, which though seldom so acute as at first, yet hurry the poor brute out of the world very quickly. Now and then some accidental but sudden exertion overwhelms the bronchia and trachea, and he falls, drowned in a fluid of his own providing. It is said that in this state, if a horse be taken into deep water, the moment he should float he is overturned, and invariably drowned. See *Paracentesis.*

Mortification is not a frequent termination of true pneumonia; the irritation or the congestion usually destroys the animal before the tissues are completely broken up. The grumous black blood effused into the air cells has been mistaken for a gangrenous state, but which state is rather marked by a mixed serous and bloody effusion of extreme fœtor, and is more common in those cases which appear epidemical, and are marked with typhoid symptoms. It must here be remarked, that, although rare, a gangrenous state of the lungs is occasionally present in pneumonia proper; it is, however, a much more frequent sequel of this disease among cattle. *Suppuration* is occasionally one of the sequelæ to pneumonia, in which instances there is also a deceitful remission of the symptoms, but not so great as in hydrothorax; it is further marked by an irritating cough, a purulent discharge from the nose, and a hurried irregular pulse. In these cases a speedy termination follows, by suffocation, or a more protracted one, in which the animal dies tabid. *Hepatization* is also not an uncommon termination, in which the parenchymatous substance of the lungs becomes so blocked up and solidified as to make them, contrary to the usual state, sink in water[*]. When the condensation is only partial, the states called thick wind and broken wind are the consequence; or an increased irritability of the lungs themselves, or of the mucous membranes of the bronchia and trachea, may be left, which subjects the horse to a long-continued or permanent cough. It is also the parent of the tuberculated state, which brings on phthisis pulmonalis or pulmonary consumption. Sometimes also the lungs themselves are left free from organic affection, but coagulable lymph is thrown out across the trachea or windpipe, which narrows its caliber at some particular part or parts, and the air, rushing through these strictures, produces a sonorous noise called *roaring*, as hereafter detailed.

On the subject of symptoms, it remains to guard the practitioner against mistaking pneumonia or inflammation of the lungs for such other affections as it may be confounded with, as with catarrh, bronchitis, or other phlegmasiæ of mucous membranes. In the catarrhal epidemic, the extremities do not continue invariably cold; the distress of countenance is not so great; sore throat is commonly present; the breathing, though quickened, is less laborious, and the pulse seldom oppressed. The cough in catarrh is generally deep, sonorous, and very painful: a weakness, not corresponding with the violence of the symptoms, is very early seen in the complaint; and though the lining of the nostrils may be inflamed in catarrh, it is seldom so much so, unless pneumonia be coming on, as to present a purple hue. The principal necessity which exists for making a careful distinction between the two diseases, arises from it not being found prudent in catarrhal affections generally, particularly if partaking of the epidemic type, to push the bleeding, and other parts of the depleting system, so far as in pneumonia; and also from the greater necessity of placing the horse in a cool temperature in the latter, to what exists in the former. Inflammation of the lungs has also been mistaken for *colic*, from the horse sometimes expressing considerable uneasiness, and often looking round to his sides; but in colic the horse evinces acute pain, by stamping with his fore feet, or kicking at his belly with his hinder: by turns he lies down and rolls, and then suddenly rises; while, on the contrary, in peripneumony, he never lies down, but stands stupidly quiet, except now and then, when he may look at his flanks: but without any of the impatient indications of pain which colic forces him to: it may be added, also, that the nasal membrane in colic remains unaltered in colour, unless enteritis be at hand. From *pleurisy* it will be more difficult to distinguish pneumonia: but true pleuritis is seldom if ever marked with the oppressed pulse present in the other: but, on the contrary, with one hard, full, and less increased in frequency, at least in the early stages. Further distinctions may also be drawn from the pain manifested on pressing the parietes of the chest in pleurisy, and by the twitchings in the fleshy pannicle which covers them; as also by the absence of the pituitary inflammatory tinge of the nasal membranes, they not being a continuous portion of the affected organ, as in pneumonia[*].

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[*] L'hépatisation est un mode particulier d'induration qui transforme la substance du poumon en une masse rouge, inorganique en apparence, mais qui ne l'est pas toujours, et qui offre plus ou moins de résistance. Le poumon alors n'offre plus une frame celluleuse, lamelleuse; il présente une substance grenue, qui se casse facilement, et qui a les plus grands rapports avec la substance du foie. Les signes qui décèlent cette induration rouge sont l'accroissement de la dyspnée, la respiration plus fréquente et plus courte, le son du thorax percute plus mat qu'auparavant, la faiblesse, la petitesse, l'irrégularite et intermittence du pouls.

Post-mortem appearances.—These, like the symptoms and terminations, vary, being, like them, dependent on circumstances connected with the nature and duration of the attack. As pneumo-pleuritis is by far the most frequent form in which inflammation of the lungs occurs, so it will usually be found that the pleuræ, in some or other of their reflexions, participate with the parenchyma in the affection. When the disease is severe, it destroys within the first three days. The cellular texture of the organ will be found choaked with dark venous blood, and irregular spots or patches of inflammatory colouring on the surface: if protracted longer, there will be superadded adhesions of the pleuræ, with increased interstitial fluid mixed with masses of coagulable lymph, the surface of the lungs being violaceous, and the substance, when cut into, ejecting a sero-sanguineous frothy fluid: or it sometimes pours out a purulent matter. In the fatal cases of hepatization, lymph appears diffused through the cellular texture, solidifies, and glues up the bronchial ramifications, and gives to the lungs the granulated aspect of the liver, with its weight, consistence, and incapacity to float in water also.

The *prognosis* must be formed from the progress the disease has made, and the intensity or mildness of its symptoms: when the pulse rises on bleeding, and some warmth can be restored to the extremities by friction, when the nasal linings do not approach a livid tint, and the horse can bear to be turned, or does not obstinately maintain one extended posture, but on the contrary shews an inclination to lie down; if his blisters rise or his rowels maturate, we are warranted in offering hope to the owner, and more particularly if the disease does not increase in intensity by the fourth day. But if, on the contrary, the pulse does not rise on bleeding, but continues indistinct both at the artery and heart, if the breathing continues very laborious, if rattling in the throat comes on, with partial cold sweats, a fatal termination may be expected. It is always a most unfavourable sign when the skin proves insensible to external stimulants; that is, when the blisters and rowels remain inert; and I hardly remember to have seen a horse recover where such has been the case: it bespeaks at once the intensity of the inflammation, and the diminution of vital power to cope with it.

The *treatment of pneumonia* must be prompt, and involves two principal indications; first, to lessen the sanguiferous distention of the lungs, and next, by counter-irritants, to set up an artificial metastasis. Proceed to draw blood to the full extent which the age, size, and state of the complaint require, which, in a recent case and full habit, may be properly continued until the animal evidently feels the effects of it by becoming faint[†], and also as long as the pulse (which should be carefully watched the whole time) becomes softer, and rises on the flow; and with the exception that a momentary and sudden faintness is now to be regarded, it may be considered a general rule, that bleeding may be continued as long as it does raise the pulse, *but not longer*. It is also to be remembered, that one full and early bleeding is principally to be depended on, and is of more importance than several subsequent ones. From a moderate sized horse, five, six, or seven quarts, or even more, may be drawn; and should the symptoms indicate a necessity for it, in three or four hours take three or four quarts more; and, as long as the breathing continues laborious, the extremities permanently cold, and the pulse oppressed, but rising on the flowing of the blood; so long the bleedings should be repeated to the amount of two or three quarts at a time, at intervals of six or eight hours. This is recommended under a supposition that the treatment commences soon after the attack: but, if otherwise, and symptoms of great intensity have existed thirty-six or forty-eight hours, the bleeding must be repeated with more caution, and the pulse most attentively watched; or the opposite extreme may be fallen into, and such debility succeed as may produce the very event we wish to avoid, by hastening gangrene or effusion. It is of considerable importance to draw the blood quickly by means of a large orifice, made with a broad-shouldered fleam or lancet, as directed under *General Inflammation*, and to suffer the blood drawn to cool gradually without disturbance; the after appearances of which will assist in pointing out the propriety or otherwise of repeating the depletion. The first bleeding over, proceed without loss of time to fulfil the second indication of making use of counter-irritation, the extent and degree of which should be proportioned to the degree of inflammation exhibited; and under this view the agent used is immaterial, there being no specific virtue in one vesicating article more than another, beyond its stimulating property: none succeeds quicker or better than cantharides. (See *Blisters*, *Mat. Med.*) And as an extensive surface of skin can bear the irritation better than any other part, and as one here presents itself wholly unconnected with the organ, save as an independent covering, proceed at once to blister the breast and sides[*], first shaving or otherwise closely clipping the hair. If the symptoms are very urgent, or a prejudice exists in favour of rowels[†], one may be inserted between the fore legs, and another ten or twelve inches behind; but, in my own opinion, rowels should never supersede the more speedy action of blistering. The less active revulsive means are such as tend to restore an equal circulation over the body generally; we therefore use very brisk, frequent, and even severe hand-rubbing of the legs, and which, when not under the friction, should be very warmly clad with coarse woollen cloth, or hay-banded. It has been proposed to scald them, as also to blister them by the usual means; and in desperate cases, particularly where there were other indications which called for it, as tumefied ligaments, exostoses, &c., it might be done: but it must be at the same time remembered, that the constitution, it is probable, could not maintain itself against the irritation of blistering both the chest and legs fully, but both might be mildly stimulated, or one part might be so treated, and another more fully blistered. It must be remembered that restoring heat to the extremities, which is but the sign of equalizing the circulation, is the very best mode of relieving the lungs of much of that undue afflux of blood which oppresses them. All parts remote from the heart should, therefore, be extra clad, as hooding the head, deep bandages to the extremities, which should also be deeply littered up; place warm quarter pieces over the croup and thighs; but add no more covering over the fore quarters than will serve to shield the horse from the cool air, which he should be allowed to breathe.

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[*] Il est assez difficile, dans le commencement, de bien distinguer une pleurésie d'une pneumonie; les symptomês sont alors presque les mêmes; l'une et l'autre affections débutent par des alternatives de chaud et de froid, l'irrégularité du pouls, la gène de la respiration, la chaleur de l'air expiré, la sécheresse de la bouche et celle de la peau: mais quand la pleurésie est bien déclarée, elle se distingue par quelques symptômes moins difficiles à saisir. Ainsi, la difficulté de respirer est différente de celle qui a lieu dans la pneumonie; elle est beaucoup moindre dans cette dernière, et les mouvemens des flancs sont plus libres et plus étendus, au lieu que, dans la pleurésie, les mouvemens de dilatation des poumons distendant la pleure, la pressent contre les côtes, et occasionnent des douleurs qui rendent la respiration pénible, l'inspiration courte et entre coupee, l'expiration lente et prolongée. Par la méme raison, la toux est sèche, rare, avec peu ou point d'expectoration dans la pleuresie, et le peu qu'il peut y avoir de matière expectorée présente rarement quelques stries de sang, tandis qu'on en remarque beaucoup dans l'expectoration de la pneumonie, qui est très abondante.—*Dict. Vet.*, *art*, *Pneumonie.*

[†] The practitioner may delay, but not wholly stop the flow, if the horse becomes faint; such a state often producing the most salutary effect on the arterial system. Another hint may not be amiss: let him not, in the outset, mistake the oppressed pulse for one of true debility: the vessels are here clogged with a *superabundance* of blood.

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[*] With some pathologists, blistering is thought to increase arterial action, and hence to be unadvisable here; but when sedative remedies are employed, the stimulating effects of proper counter irritants confine their effects to the skin, or parts to which they are applied, and prove most salutary. Many French authorities likewise are not favourable to them. Hurtrel d'Arboval says, 'Sans bannir absolument les révulsifs du traitement de la pneumonie aiquë, on ne peut s'empêcher de reconnaître qu'ils sont souvent inutiles, et qu'employés trop tôt ou trop tard, ils sont nuisibles. Les vésicatoires aux faces latérales et un peu déclives du thorax, le séton à la pointe du sternum, sont les moyens de ce genre qu'on applique le plus fréquemment; nous pourrions citer un grand nombre de cas où ils ont déterminé des tuméfactions gangréneuses. Dans ce cas, et quelle que soit sa forme, l'exutoire subsiste d'abord sans engorgement et sans suppuration pendant trois ou quatre jours; la matière qu'il rend ensuite est sanieuse et décomposée, bien différente du pus brun, qui n'est quelquefois sanguin que parceque l'animal se frotte; puis il survient, à l'endroit où l'exutoire est placé, une tuméfaction œdémateuse, qui devient promptement gangréneuse, et gagne quelquefois le dessous de la poitune, le ventre, les membres, &c.' The owners of horses, particularly of such as are on sale, object to blistering frequently, because it disfigures the animal for a long time afterwards; but it should be represented to them, that no substitute gives an equal chance of saving life. It must be evident that, for the cure of an inflammation which extends through the chest, the counter-irritant must be extensive also, and there is none sufficiently active that will not raise the cuticle and separate the hair. If the objection be persisted in, then insert a rowel in the brisket, another opposite the elbows, and a third about ten inches behind that, quickening their action by smearing the plug with ung. lyttæ *(blistering ointment)*.

[†] Those who prefer rowels and setons to blisters, gain a host in Mr. Sewell, who is favourable to them in these cases, observing that, as being deeper seated, their action is more intense, permanent, and harmless; and that by their insertion some of the subcutaneous vessels must be lacerated, and effusion produced, but blistering sometimes fails altogether.—*Veterinarian*, vol. ii, p. 161-2. Osmer's plan, which was compounded of both plans of counter-irritation, was not an ineligible mode of raising a quick, active, and permanent stimulus to the integuments of the chest. It consisted in making numerous small openings in the skin, and introducing pledgets of tow smeared with blistering ointment.

On the subject of cold used as a sedative by Mr. Coleman in his early career, in this complaint, extended experience and a praiseworthy candour have mitigated the severity of it. For though the theory of the action of this agent was ingenious, and the principles of the practice probably correct, yet there is every reason to believe that it was at first carried too far. That the coldest air, even applied to the surface of the inflamed air cells, does prove grateful to the feelings, there is little doubt[*]; and the circumstance that horses, when left to themselves in this disease, will be always found opposite a full draught of air, bespeaks the momentary relief it occasions: but the effect which full exposure to the action of cold air has on the skin, the connexion of which with the lungs is intimate and sympathetic, cannot fail to prove injurious[†]. But a modification of this system now prevails, and with the best results: therefore, let the horse have a due share of clothing, particularly about the extremities and head, but by all means place him in a loose box; and if the weather be not stormy, cold, or the box do not admit of a *current* of air through it, let the window or door remain open, and, if possible, keep the general temperature of it, if free from draughts of wind, and the horse be properly clothed, rather below than above 50°. We owe also to the same ingenious Professor the knowledge that nauseants prove valuable arterial sedatives, and the article first extensively employed by him for the purpose was the *aloe;* and as long as aloes simply nauseate, and refrain from actively purging the bowels, they do good. But as they are very apt to promote active and sudden purging, when not expected so to do, they cannot be altogether depended on; for if purgation be expected to do good as a derivative, we are in error: in the horse it is found that any irritation of the alimentary canal is sure to extend its influence to the contiguous viscera, particularly if any of them are in a state to favour the metastasis[‡]. Veterinary practitioners of the present day, therefore, endeavour to keep the bowels soluble by other means, or by the use of aloes only to a certain point.

A more certain nauseant has been brought into use by Mr. Percivall, the *veratrum album*, or *white hellebore*, and experience seems to extend its use: it still has opponents, and it still has rivals in digitalis, antimony, nitre, ipecacuanha, and camphor; but under such testimonies as now crowd on us in its favour, particularly as to its effects in pneumonia, I would recommend it to the notice of the veterinarian, assuring him that I have witnessed its efficacy; although I have, from long experience, remained favourable to the remedies yet to be noticed[*]; which, as there will be found many cases wherein the more active nauseants cannot be persisted in, and as the milder sedative effects to be gained from digitalis, antimony, &c. have, in my own practice, and that of many others, proved successful, I still strongly recommend them according to the following formulæ; observing that I have determinedly, in bad cases, in the later years of my practice, successfully united them with hellebore and other more active nauseants in moderate doses, being of opinion, with Dr. Geo. Fordyce, that the union of several medicaments under a unity of intention act more advantageously often than any single article.

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[*] It is not impossible that more oxygen is actually separated by the inspiration of cold air than of that of a warmer temperature; and that also as the free current must partake less of other gaseous mixtures, so, consequently, the oxygenous base is by this means further increased: and as it will of course follow that a larger quantity of carbonic acid is passed off, so this may likewise materially lessen the distress: but the action of the cold air on the cutaneous vessels must greatly aggravate the morbid afflux to the lungs.

[†] When we reflect that horses which have once been affected with any inflammatory complaint of the bronchial passages are, ever after, liable to receive much irritation from the sudden access of cold, and will cough as long as they remain in it; it would be matter of surprise if it did not also aggravate a complaint of a similar kind, to which was added a morbid sensibility and susceptibility of the surface of the body generally.

[‡] Nous ne parlons pas des purgatifs; ils ne peuvent agir que comme dérivatifs, et peut-être en déterminant sur le canal alimentaire une irritation, qui pourrait bien à son tour ne pas être a l'abri de réagir sur le poumon enflammé; leur usage nous paraît devoir être banni du traitement de la pneumonie.

No. 1.—	Antimonial powder	two drachms
	Digitalis *(powdered foxglove)*	two drachms
	Nitrated potash *(nitre)*	three drachms
	Supertartrate of potash *(cream of tartar)*	three drachms

Mix with honey to make a ball, and give every four, six, or eight hours, according to the urgency of the symptoms. Consistently with what has been just stated, in cases of *great urgency*, and where the practitioner has been early called in, while the vital powers are unimpaired, I would recommend the following:—

No. 2.—	To ball No. 1, add of Pulv. verat. alb. *(white hellebore)*	10 grains
	Pulv. ipecacuanha	12 grains.

In cases where cough is a predominating symptom, indicating some tendency to bronchitis, and soreness of the chest, nasal discharge, &c., bespeak a general catarrhal tendency, the following formula is to be preferred, as more immediately calculated to relieve these symptoms:—

No. 3.—	Tartarized antimony	two drachms
	Powdered foxglove	one drachm and a half
	Nitrated potash	three drachms
	Simple oxymel (see *Mat. Med.*)	four ounces
	Liquor No. 3, p. 318	eight ounces.

I have, in some such cases, where the active inflammatory symptoms were not such as utterly to forbid it, added tinct. opii, half an ounce, with much relief to the cough.

With regard to food, no anxiety need be entertained for a pneumonic patient, at least for the first twenty-four or thirty-six hours, during which time, even were he inclined, the less the animal eats the better, unless green meat can be procured, which being aperient and diuretic, may be given in moderate quantities only; and in the absence of this, bran mashes may be allowed, with a small quantity of hay: but no corn should on any account be offered, nor should his mashes be given hot, or hung round the head, as in catarrhal fever, bronchitis, &c. On the contrary, every thing that heats the air inspired by the lungs increases their action, and the disease can only be properly treated by a strict observance of whatever tends to diminish the inflammatory diathesis. In this point of view, though, as before noticed, we must carefully abstain from producing purging, we should also as studiously avoid costiveness, which is best done by back-raking, or by aperient clysters; and, in case of failure in these, a more efficient laxative may be given by the mouth (see *Laxatives*). As an indication of great importance, I again repeat, that the warmth of the surface should be strictly attended to; the body and extremities should be frequently examined, and whenever any part is found to be getting cold, the means before detailed should be resorted to, to promote a return of the circulation. During the continuance of the complaint, linseed tea, slightly warmed, may be given to drink frequently; and if this be refused, give chilled water, and, occasionally, horn down the tea; or, if preferred, the following *liquor*, particularly if there be cough and much chest soreness:—

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[*] As in this inflammatory affection I am more favourable to the use of this medicine than I am to it in many others, as not acting on the remainder of the alimentary canal usually, so I quote Mr. Percivall's own account of its effects. 'He has used it,' he observes, 'twelve years, and reposes on it with considerable confidence. It acts as ipecacuanha does in the human subject; it will excite nausea, and if carried farther, produce efforts to vomit: it diminishes the force and frequency of the pulse with singular efficacy; it abates all the inflammatory symptoms, and it influences, I believe, the action of the perspiratory vessels. Although it is a remedy of the most active kind, and one whose operation demands unremitting vigilance, it is one that we have most completely under our command. I commonly give it in the dose of a scruple or half a drachm, and repeat it every four, six, or eight hours, according to the urgency of the case. Watch continually the symptoms of nausea, as extreme dulness, hanging of the head in or under the manger, and frothing at the mouth. A pulse which will be found to have sunk to an unexpected degree in force and frequency, may previously give us warning, and prevent our carrying the medicine so far, unless desirous of making a greater impression. Having once affected the pulse, I recommend that the dose be diminished, given at longer intervals, or suspended altogether, according to the pressure of the case.'—*Lecture* 38, *Disease of Lungs.*— To this I would add, that, as far as my experience goes, the hellebore is a valuable agent, but a very active one, and one that may with propriety be *principally resorted to*, where the strength of the patient will bear it, the urgency of the symptoms require it, the period of the disease (its active inflammatory state) call for it, or where the administration of other remedies have failed: but it is imperatively necessary on the practitioner, that he carefully and frequently examine the pulse during its exhibition, as often as every hour, if possible: if he cannot do it in person, he ought to have an assistant at hand to whom he could entrust it; for such extreme prostration will sometimes steal over the frame by a continued use of it, in pneumonic cases especially, and that particularly where the nausea has been great, or accompanied with long-continued efforts to vomit (which is here a most injurious consequence), as to collapse the system beyond all recovery. As soon, therefore, as the pulse is found to lower by the use of it to an indistinctness not before present, desist immediately, and, as the debility is more or less considerable, combat it by cordials, as sound ale with opium, ammonia, or other proper stimulants, until the pulse again rallies, when pursue the treatment with the milder sedatives, and refrain from further stimulants, unless called on by renewed debility, or any symptoms of a gangrenous tendency.

No. 3.—	Linseed and liquorice root, of each...............	four ounces
	Mallows..	two handsful.

Boil in six quarts of water half an hour. It is, however, prudent to observe, that as little disturbance and force should be offered the horse as possible in this complaint, therefore horning down fluids should never be practised but when absolutely necessary. By steadily pursuing this mode of treatment for the first thirty-six or forty-eight hours, it may be expected that the distention and inflamed state of the pulmonary vessels will subside into resolution, which will be indicated by the appearances detailed in the prognosis; and any favourable remission having taken place, without applying to what are termed cordials, support the strength by thick gruel or malt mashes. Should more direct debility notwithstanding make rapid advances, substitute the following for the other medicines:—

No. 4.—	Powder of ipecacuanha	two drachms
	Tincture of opium..................................	half an ounce.
	Camphor	two drachms
	Acetated liquor of ammonia (see *Mat. Med.*)...	four ounces.

Rub the camphor with the tincture and powder, and then add the acetated liquor of ammonia, and give with half a pint of gruel, or liquor No. 3.

Let it be remembered, however, that direct stimulants are admissible only in cases where the severity of the inflammatory symptoms has relaxed, and when from the existing debility sanious discharge from the nose, &c. there is reason to fear a gangrenous termination, as will now and then occur. In such cases some veterinarians, as Mr. Proctor, of Solihull, have boldly and even successfully administered ammonia, sulphate of copper, and brandy. See *Veterinarian*, vol. iii.

But when, on the contrary, there is more reason to dread a fatal termination by congestion, and the intensity of the inflammation does not seem to abate, continue to push with vigour the arterial sedatives, particularly No 2. Should the first blistering not prove effective, either rub in more ung. lyttæ, or proceed to scald the chest by means of cloths dipped in water nearly boiling and held closely to it. If the breathing becomes very laboured, place the horse's head towards, or even without, an open door or window, but, as before observed, by all means avoid a current of air through the stall or box. In the more early stages, carefully avoid all medicaments usually considered as either sudorifics or expectorants, which is but another term for stimulants: it is the active inflammatory symptoms which are to be combated, and these are best subdued by full and early depleting and sedative means. The only stimulants admissible in the inflammatory state are external ones, as counter-irritants; these never lose sight of. Be it further remarked, that when a favourable termination seems to have taken place, the care should not relax: it is a disease very liable to recur; and is very apt to leave for some time such a state of lung (if it do not destroy by recurring pneumonia) as any imprudence will fix into a ruinous chronic affection, as thick wind, broken wind, or even phthisis. It remains only to add, that in those cases marked with symptoms of serous collections within the chest, although the treatment is seldom fortunate, yet that we should always evacuate the fluid by an operation. (See *Paracentesis* and *Hydrothorax.*)

PLEURISY.

Pleuritis, as a distinct disease, will not occupy much of my attention, as the treatise on pneumonia embodies most that is practically necessary to note in it. In what is there stated it will be seen, that in an unmixed state it is a rare disease in the horse; but that, combined with pneumonia, it is a very frequent one. As *causes* of pleuritis proper, one of its most frequent is external violence, particularly of punctured wounds, which injure the costal pleuræ without disturbing the integrity of the lungs; as is not unfrequent when the injury is inflicted by a blunt instrument entering in a slanting direction, as a goad with a cow's horn. In such a case, the affection may continue confined to one side only, but in most others it extends to both sides, though not always in an equal degree. It may be occasioned also by any of the causes which produce pneumonia: exposure to wind, rain, or snow, I believe to be one of the most common among these.

The *symptoms*, like those of pneumonia, make a rapid attack, or they do not arrive at their intensity for three, four, or five days. A disturbance in the respiration is usually first remarked; where, contrary to what is observed in pneumonia, the inspirations are quicker than the expirations, but both evidently give pain, and the expired air is usually hotter than natural. Cough is here more invariably present than in simple pneumonia, which, *à priori*, might not be expected; but it is short, suppressed, and painful: sometimes the horse stamps, as in the cough of catarrh or bronchitis. Mr. Field's excellent account of it, as it appears in *The Veterinarian*, vol ii, notices a trembling folded appearance of the integuments, produced by the cough. The nose is dilated, as in pneumonia, to aid the difficulty in respiration; but the nasal membranes are but little tinged. It is particularly characterized by the pain which pressure on the sides produces. 'L'animal témoigne une très grande sensibilité sur tout la surface des côtes, d'un côté ou de l'autre; quand on percute cette partie, la percussion ne fait entendre qu'un son sourd, si même on en obtient cette sensibilité du thorax, l'un des signes pathognomiques de la pleurésie dénote bien une douleur dans une partie quelconque de la plèvre costale.' *Hurtrel d'Arboval.*—The pulse is usually hard, full, and but slightly accelerated in the first stage. From this detail of symptoms, as well as from what has already appeared in the account of pneumonia, the distinguishing marks between pleurisy and inflammation of the substance of the lungs may be gained. The further progress of the disease is not dissimilar to that of pneumonia. If the symptoms quoted do not become aggravated by the fifth or sixth day, a favourable termination may be expected; but if, on the contrary, the pulse becomes much quickened, small but wiry, and indistinct, and great restlessness with irregular sweating come on, it will prove fatal, and the post-mortem examination will detect extensive inflammatory marks over the costal, lateral, and diaphragmatic pleuræ, with numerous adhesions and coatings of lymph: sometimes a considerable effusion has taken place, as in pneumonia.

The *treatment* does not differ from that of pneumonia in any other particular, than that we may, with greater safety, here call in the aids of purgatives and diuretics.

INFLAMED LUNGS IN NEAT CATTLE.

Horned cattle are also subject to pneumonia, but not by any means in an equal degree with horses. Cowleeches and graziers call the complaint *rising of* *the lights*, and it has also other provincial names unnecessary to be noticed here. Various *causes* may occasion it; as exposure to inclement weather, over driving from fairs, &c., in which the vicissitudes of temperature they undergo, acting on their plethoric state, distend the pulmonary tissues: I have also seen it in calves. The *symptomatology* is the same as in the pneumonia of horses: I know of no difference, but that there is a discharge by the mouth, which, from peculiarity of structure, admits both the air to pass by it and serous evacuation likewise. It must also be observed, that the low type is apt to prevail in all their diseases; and that, from the increased volume of their aortic system, their inflammations hurry to their termination, be it bad or good, sooner than those of the horse. Hence it is more common for pneumonia to end in gangrene in cattle than in horses. The *treatment* also differs in no other respect but in that the depleting system must be prompt, and can with propriety only be pushed in the first stages. It may also be remarked, that structural peculiarity in the alimentary track makes it proper to give all their medicines in a liquid form.

INFLAMED LUNGS IN SHEEP.

Few of the writers on horned cattle notice *peripneumony* as a disease affecting sheep; but I have seen it well marked, and in them also its origin could be clearly traced to exposure to inclement weather. In my notes of practice, I find that the disease was rather prevalent among the few sheep that were kept near London in February 1808. Among other cases that fell under my notice, were some in the flock of Mr. Adams, of Mount Nod, near Streatham. From the shepherd's account I gained, that all the sick were attacked nearly together, immediately succeeding a very stormy cold night; five of whom were dead when I arrived, and five others, all ewes and within a month of their yeaning, remained yet alive, but extremely ill. The symptoms in all varied very little. The first appearance was loss of appetite, which was soon succeeded by a fixed stare, the head was elevated in the air, the mouth opened, the flanks heaved violently, the conjunctive and pituitary membranes were much injected, and a fluid distilled from the nostrils, serous in some and purulent in others. They were occasionally seized with epileptic fits, would fall backward, and when recovering from it the teeth would be heard to grate together, The *examination* of the five dead ones exhibited the parenchymatous substance of the lungs highly inflamed in all of them; in some, the whole of the lobes, in others those of one side only, were affected; but wherever the inflammation reached, that part was condensed almost into a solid mass by the congestion; some of the air cells also contained pus: the costal and mediastinal pleuræ were little affected. In two, the liver was also slightly inflamed, but which was not a primary but a secondary effect, brought on by the participation of neighbourhood. It is somewhat remarkable that each of them contained two fœtuses. The five that were living I immediately bled and blistered; and, as soon as it could be procured, a drink was given to each, composed of nitre and tartarised antimony, which treatment appeared to arrest the disease, as the whole recovered; and all, except one, went their full time, which one yeaned while I was standing by: and in despite of her illness, which was excessive, yet made feeble efforts to suckle and cherish her young one, and appeared rather amended by the event: both mother and young lived. The *treatment* of the peripneumony of sheep in nowise differs from that of neat cattle: bleed from the amount of half a pint to a pint, shear the sides and blister, and give one-third of either of the recipes directed for kine: house the sick, but not too warmly; and if the cud be lost, drench with gruel.

CHRONIC INFLAMMATION OF THE LUNGS, ENDING IN TUBERCLES AND PULMONARY CONSUMPTION.

PHTHISIS pulmonalis is not a very uncommon disease in the horse, deriving its origin from a tuberculated state of the lungs, left as a sequel of pneumonia, &c.: now and then, it is probably a primary or purely constitutional affection. It first attracts notice by a short dry cough and an unthriftiness of coat; the strength flags under exercise; the pulse, at first but little altered, as the disease advances becomes quickened, somewhat smaller, and very singularly hurried on exertion. The appetite is now affected, and pus mixed with mucus is passed from the nostrils, which in the latter stages is mixed with clots or coagulæ, which escape both by the mouth and nose in the act of coughing. In the still more advanced stages the discharge increases and is very fœtid, the hair falls off, the body wastes, and the complaint either degenerates into absolute glanders or farcy; or the animal sinks under the hectic irritation, or is suffocated by the accumulated pus. If a horse be destroyed in the early stages, the tubercles appear like small hardened masses, dispersed throughout the parenchymatous substances of one or both lungs, varying in colour and size from that of a pea to that of the largest hazel nut. In a later stage, these soften internally, and pus is secreted within, which, eroding and absorbing the walls, escapes, and more extensive ulceration follows.

As the disease is invariably fatal, it is useless to prescribe an uncertain *treatment* for it.

INFLAMMATION OF THE HEART.

IDIOPATHIC carditis, as an uncombined disease, is very rare in the horse: but combined with pneumonia and pleuritis, particularly with the latter, it is not so rare; indeed it is not easy to conceive how the mediastinal pleura can be affected without the pericardium participating, and then transition to the heart is almost a natural consequence. Hurtrel d'Arboval says it more frequently exists with pericarditis, but that as a primitive affection it is not yet recognized ('*n'est pas encore constatée*') among veterinary nosologists: it does not enter into the nosology of M. Huzard. Hurtrel d'Arboval notices a case that occurred in an ass, in the veterinary college of Lyons, in which there was carditis, but accompanied with pleuritis, and which was particularly marked by vertigo. I have myself seen two cases, but which were neither of them uncombined with pericarditis and pleuritis, and both terminated by hydrops pericardii, or serous effusion into the pericardiac bag. Mr. Percivall has also met with cases of carditis, but all of them combined; and he notices that he found the pericardium coated with lymph, and in one instance thickened into a semi-cartilaginous substance. The symptoms in the cases which fell under my own notice differed so little from those present in pneumonia, that I considered them as such, and treated them accordingly. There was, however, I well remember, a peculiarity in the pulse in both cases. It was marked by oppression, as in pneumonia; but superadded to that, a peculiar wiry yet fluttering feel was observable, totally distinct from any other I had ever felt. The countenance and manner were also marked by an expression of anxiety and alarm; but acute pain did not appear present: both cases terminated fatally. The *treatment* of carditis, thus combined, would in no respect differ from that of pneumonia; but were we assured of its true idiopathic character, we should blister and rowel the under surfaces of the chest principally; and we might push the nauseants to their full extent, purge the bowels, and, as a revulsive drain, bleed from all the toes, as well as from the jugulars.

INFLAMMATION OF THE STOMACH.

Gastritis is also a rare disease, *though the stomach of the horse is certainly sometimes primarily attacked with inflammation*[*]; but the cases in which it occurs are very difficult to detect, the symptomatic appearances being so nearly allied to enteritis, with which it is usually combined, and to which it is rather a sequel than a precursor. By *gastritis proper* we should understand an idiopathic inflammatory attack on the mucous surface of the stomach, wholly exclusive of inflammations produced by poisons or acrid substances admitted within it, or of that consequent on mechanical distention, called stomach staggers: the former remains to be treated of, the latter has already occupied my attention. The symptoms of idiopathic gastritis, as far as they are noted, are extreme distress and restlessness, a loathing of food, and if any thing be given by the mouth it creates increased pain for a long time afterwards. The animal breaks out into cold sweats, lies down and quickly rises again, as in inflammation of the bowels; becomes early and greatly prostrated in strength, and has a pulse usually quick and much oppressed. If the disease can be clearly detected, *treat* it in every respect as directed under *Enteritis*, except as regards internal remedies: of such it is evident that those only of the most sedative kind ought to be tried; as the following:—

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[*] The above sentence in italics is the same with that in which this subject appeared in the two last editions of this work; yet M. Hurtrel d'Arboval is led by some error into the following misstatement:—'On a été jusqu'à prétendre que la gastrite ne ce présentait jamais seule, telle est du moins l'opinion de Delabère Blaine: mais c'est une erreur, que cet auteur n'aurait sûrement pus commise s'il avait ouvert beaucoup de cadavres, car on trouve souvent, aux autopsies cadavériques, non seulement l'estomac seul enflammé, mais encore la membrane muqueuse de ce viscère, indépendamment de toute autre de ses tuniques. Cela n'empêche pas que, dans d'autres circonstances, la maladie ne soit fort souvent compliquée de l'inflammation de l'intestin, du mésentère de l'epiploon, et quelquefois d'autres viscères abdominaux.'

> Dissolve two drachms of superacetate of lead *(sugar of lead)* in eight ounces of water, to which add four ounces of very pure olive oil, and give every three hours.

In a well marked case, pouring iced water into the stomach might not be an improper experiment.

INFLAMMATION OF THE INTESTINES.

Enteritis, or the *red colic* of farriers, is a phlegmonous inflammation of either the peritoneal or muscular portion of the intestines; or it has its seat in both these portions, which is, I believe, by far the most frequent occurrence*. Observations on a great number of cases will also shew that the villous coat is not unfrequently a participator in the affection: in fact, the abdominal inflammations in the horse, as well as the thoracic, seldom exhibit exact lines of demarcation; but are very liable to stray by continuity, and even by contiguity; hence we have some *characteristic* symptoms or signs; many more which are *mixed* and *indefinite;* and some altogether *anomalous* in all acute visceral affections. There are, however, sufficient grounds for a general division of the inflammations of the bowels into *enteritis*, or that which principally affects their *external coats*, and is generally accompanied by costiveness; and that which primarily attacks their *villous surface*, and is productive of diarrhœa or dysentery. Between these states there is a sufficient mark; but between inflammatory and spasmodic colic the distinctive lines are familiar only to the experienced observer. When the gripes, gullion, or fret, as spasmodic colic is called among farriers, attacks a horse, it is usual and useful to give him powerful stimulants, active motion, and strong friction, all which would be baneful in the extreme in red colic. A careful distinction should therefore be made between the two diseases, which may be readily done by attending to the characteristic marks of each, as particularly detailed in spasmodic colic. Its progress is rapid in the extreme, and its fatality very great.

The *Causes* are various: the application of cold is certainly among the number, and I have distinctly traced it to that source in several instances†, as washing when hot, or plunging into a river; the drinking of cold water has likewise produced it, though more frequently this occasions spasmodic gripes. A long retention of impacted fæces, from improper feeding with dry food and little water; worms likewise may, now and then, bring it on, as also hernia or intussusception, occasioned by one part of a gut becoming invaginated within another; or it may be produced by metastasis, or the translation of the inflammatory state of another part, as of the feet and of the neighbouring viscera. Spasmodic colic neglected or improperly treated is not an unfrequent cause, and calcareous concretions have occasioned it.

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* Professor Peal observes, on enteritis, 'that it is an inflammation of the peritoneal coat of the intestines,' p. 184. Mr. Percivall, on the contrary, avers 'that the muscular and cellular structure intervening between the peritoneal and mucous coats, is primarily and principally affected.' Mr. P. further states, that the post-mortem examination of these cases will shew the peritoneum little bloodshot; but it is the muscular portion which is gorged with red blood, shining through the other, which produces the external tinge.' As far as my own observations on the subject extend, I have remarked that both these portions have participated in the inflammation, but principally the peritoneal; and the complete similarity between enteritis and the acknowledged cases of peritonitis gives much weight to this view of it. Hurtrel d'Arboval gives, as the French view of this disease, a division into enteritis acute, chronic, diarrhœic, and dysenteric.

† In pneumonia either transition of temperature appears capable of producing the disease; but in enteritis, I believe, it seldom occurs but on the sudden transition from heat to cold. Mr. Percivall con-

The *Symptoms.*—It is known sometimes to commence by a shivering fit, to which succeeds heat of skin, restlessness, loss of appetite, the mouth being particularly hot and dry, and the inner membranes of the eyelids and the linings of the nostrils rather redder than natural. As the inflammation advances the pain increases, so as to force the horse to lie down and get up again frequently; but, unless the pain be very acute, he seldom rolls on his back as in the gripes; but, as he will occasionally do so in particular cases, this should not be considered as an infallible criterion between this and gripes. He will kick at his belly, stamp with his feet, scrape his litter or stall with his hoofs, and look wistfully round towards his sides. The pulse in most cases is frequent, as 90 or 100, and usually small and rather wiry[*]. The breathing is accelerated, but is not usually laborious: the belly is painful to the touch, which does not occur in colic: it is also hot to the feel, and the pain, instead of remitting as in colic, is constant; and the extremities are cold, while the surface of the body is often hot. The bowels are usually constipated, and if any dung be evacuated, it is in small, hard, and dry masses, and is most likely that which had been accumulated prior to the attack. The anus, if examined, will be found very hot, and sometimes even internally inflamed; it also, in many cases, quivers with the intensity of the general affection. Frequently there is some tympanitis or distention of the belly, which much aggravates the general tenderness evinced on examination. The urine is painfully evacuated in small quantities, and very highly coloured; sometimes it has much mucus suspended in it. In the progress of the disease these symptoms increase in intensity: the distress of the horse is expressed by his groans, his violent efforts to change his position, as if to fly from his malady, while perspiration, partial or general, breaks out, and is then succeeded by a chilly state, with muscular twitchings; the pulse becomes more and more hurried, intermittent, and at last nearly imperceptible: and the respiration is as hurried and irregular as the pulse, and occasionally interrupted by a convulsive sigh. The vital powers are now fast ebbing, and the animal sinks after a few feeble struggles, or he parts with life with more violent convulsive movements.

Post-mortem examination of these cases presents inflammatory marks, sometimes confined, sometimes general. In some cases the large and in others the small intestines are the principal victims; the external surface of the affected parts is always heightened in colour; sometimes the redness is intense, at others it assumes a purple hue, as the approach to gangrene is nearer or farther off; and occasionally is black and nearly dissolved, when fully established: in some cases an internal hæmorrhage from the inflamed vessels has filled the tube, particularly of the smaller intestines, with blood.

The *Prognosis.*—If the costiveness be early removed; if the pulse become softer, more full, and less frequent; if the pain remit, and the heat of the body

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siders cold as not a frequent agent, and remarks, that were he to turn out a hundred horses, he should not anticipate one attack of enteritis. I also should fear pneumonia more; but if ninety out of the hundred were aged horses, some of them light-carcassed, and such as are termed washy, which are often horses of much irritability, the balance would rather be turned towards the liability to enteritis. 'La cause la plus fréquente de l'entéritie sur-aigue est l'eau froide et crue, surtout celle nouvellement tirée du puits qu'on laisse prendre à discretion et tout d'un trait aux chevaux qui out chaud, dont la sueur a été excitée par une course rapid et véhémente ou par des rudes travaux.'

[*] A very rapid and contracted pulse is, however, not by any means constantly present in the first stage; but, on the contrary, it is then often hard and full, and not increased beyond 55 or 60. Indeed, as far as my own experience goes, it commences in this way in most cases: it is the rarity of our seeing our patients until the full force of the disease is present, that fixes our opinion of a very frequent and contracted state of the artery as a pathognomonic symptom.

and extremities appear equal, it will terminate favourably. But if the costiveness remain obstinate, or, otherwise, a voiding a black fœtid matter appear; if the pulse become more quick, and waver also; and if the extremities continue invariably cold, the danger is great. And when added to these, if there be a peculiar earthy cadaverous smell from the mouth, with cold sweats, delirium, and extreme debility, and particularly if the belly become more and more tense, the termination will be, almost to a certainty, unfavourable; and as soon as the pain ceases in such a case, gangrene may be known to have commenced.

The *Treatment* in enteritis should be singularly prompt and active, as an instance of recovery seldom occurs where the remedial means have been delayed beyond the second day: indeed it often destroys in twenty-four hours. Bleeding is the first indication, and if the subject be young, large, and plethoric, six or seven quarts may be safely taken away; and should the symptoms continue unabated, the same may be repeated in four hours, to the amount of four or five quarts more; nor should even a third lesser bleeding be omitted at the same distance of time, if the inflammatory appearances have not become mitigated. The bleeding may be known to have a salutary effect by the pulse becoming softer and fuller, particularly if it shew a disposition to rise as the blood flows. Here also it is proper that the blood be abstracted quickly and from a large orifice. As soon as the first bleediug is over, proceed to back-rake, to remove any hardened dung that may obstruct the passage, and which, if suffered to remain, would infallibly aggravate the complaint, and which indeed in many instances is the cause of it: the distressing strangury that sometimes accompanies the red colic is also frequently as much produced by the pressure of hardened excrement as by a renal participation in the inflammatory affection. It is not the dropping away a few balls of hardened dung, nor the passage of some thin glairy matter, which shews that no obstruction exists: on the contrary, when these are present, a most obstinate costiveness may yet remain farther up in the passage; and a flow of thin fæces may escape by a groove formed by the side of an obstructing portion of dung, as has happened if a very large fæcal accumulation has taken place within one of the pouches of the colon. Unless there be evidently a free passage throughout the whole canal, it is always proper to back-rake; for it must not be lost sight of, that costiveness in true enteritis is always present, and when not its cause, is always its most aggravating symptom; and until it be removed a resolution of the inflammation cannot take place. It is also necessary to bear in mind, that as the state of the bowels is such as not to render it prudent to allow of strong purgatives being given by the mouth, so the greater activity is required to empty them mechanically, and by the assistance of *laxative* clysters, (See *Mat. Med.)* which should be thrown up very frequently, until it is certain that every obstruction is removed. Injections of thin gruel or of warm water may be afterwards occasionally given as a topical application. The quantities composing the clysters should be very considerable also, so as to penetrate beyond the rectum, and to enter, if possible, the colon and cæcum, which intention can be best fulfilled by Read's patent *injection syringe*, which no veterinarian should be without. (See *Clysters.)* Tobacco clysters have proved beneficial.

The next indication is to raise a brisk external inflammation over the belly, to lessen thereby the internal affection; and in this case even the cantharides are hardly quick enough in their action: but a more speedy determination to the skin may be made, by first fomenting the belly with hot water for a quarter of an hour, and then by applying a large mustard poultice farther liquefied with oil of turpentine, or with the liquid blister (See *Mat. Med.)*, which may be spread on coarse linen, or a horse cloth; or, what is greatly preferable, the fleshy side of a newly-stripped sheep-skin may be covered with it, and then applied close to the belly by means of flannel rollers, which will retain it in its situation. When this has remained on for three or four hours, if an evident abatement of symptoms has not taken place, then proceed to blister in the usual way*. If a situation were to occur, where nothing besides of a blistering nature was at hand, the belly might be actually scalded with boiling water, or a hot shovel might be drawn over it; or any other means may be made use of to stimulate the abdominal surface that are in the reach of the person employed on the occasion. It next becomes a consideration as to what remedies may be properly given by the mouth, which must greatly depend on the costive state of the bowels[*], which should be a very principal subject of solicitude; and I should by all means recommend that the most strenuous efforts be made to remove it; first, by injections, which having failed, I then without hesitation advise the practitioner to give a drink of a mild laxative nature, as castor and linseed oils, six or eight ounces of each, with gruel, broth, &c. or otherwise one of six or eight ounces of the sulphate of magnesia (Epsom salts), dissolved in two pints of water; and after a lapse of two hours, if this had failed to operate, proceed to give a second, with five or six ounces of a watery solution of aloes, which repeat, or substitute even more active agents, and that particularly in such cases as there is reason to believe resulted from constipation primarily; for these, it will be found, will always bear active purgation without irritation. The bowels once opened, give only such mild matters as an inflamed surface might be supposed to be uninjured by, as hay or linseed tea, gruel, &c. &c. The temperature of the stable should be moderate; the same care should be bestowed on equalising the circulation as prescribed under pneumonia, by rubbing the extremities, proper clothing, and a loose well-littered box; and as it leaves, like pneumonia, a liability to recurrence, let the animal be worked or exposed with much caution.

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* In human enteritis a very marked advantage has been received from the use of very large bread and milk poultices, applied over the whole surface of the belly. The cessation of the inflammation followed so rapidly after the use of this mode of applying external warmth, that it might be worthy

INFLAMMATION OF THE MUCOUS SURFACE OF THE INTESTINES.

As the former affection consists of a phlegmonous inflammatory attack on the peritoneal covering or coat of the intestines, this latter is usually an affection of their villous surface, having for its *cause* irritations applied in various ways, as by translations of obstructed perspiration, metastasis of other inflammations, the continued use of certain aliments, but more particularly the administration of improper purging medicines, either as to quantity or quality; by which such irritation is brought on as ends in inflammation. It is commonly accompanied with purging, whereas the former has almost always costiveness connected with it; neither is the pain so acute in the latter, consequently the horse seldom expresses his uneasiness by much rolling or stamping; the pulse is also quick and small, but is seldom very hard, even from the beginning. If the symptoms of inflammation be very active, that is, if the pain approaches distress; if the extremities feel cold, and the pulse betokens much vascular action, three quarts of blood may be drawn; but unless these appearances exist in force, it will be more prudent to omit it. Stimulants should, however, be applied to the bowels, as in red colic; the stable and the clothing also should be warm, and means should be

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the veterinarian's trial. On the contrary, a Dr. McCarthy relates, that, in tropical climates, human enteritis is successfully treated by cold water externally and internally applied. Neither will the observant pathologist find any difficulty in reconciling both these treatments to fact or to theory.

[*] The practitioner should be informed, that there exists much contrariety of opinion on the subject of purgatives in enteritis. Mr. Percivall advocates them, and instances the human practice of giving calomel and colocynth. Mr. Youatt, I believe, considers that an active purgative would be poisonous; while Hurtrel d'Arboval, whose writings are a summary of the best opinions and best practice of the French veterinary schools, barely notices constipation as a symptom, and wholly omits any necessity of removing it; the treatment prescribed by him being principally confined, as regards internal remedies, to mucilaginous drenches, mixed with honey and olive oil, with a small quantity only ('très peu') of nitrate of potash (nitre). I can, from my own experience, only observe, that while I have some dread of the effect of an active purgative on an inflamed bowel, I have much more of the effects of constipation. This I have always found fatal; but I have administered all the milder, and even the more active purgatives, save and except the croton (but which I would give sooner than risk the patient's dying of the obstruction), without increasing the urgency of the symptoms, and sometimes with the happiest results. The castor oil, I am aware lies, and very deservedly lies, under censure as a dangerous purgative; but I think I have found it very useful in enteritis, where it may be supposed even the mucous surface of the canal to be in such a state as not to be affected by agencies in the ordinary way; and desperate diseases must have desperate remedies.

taken to keep up the circulation in the extremities by hand-rubbing and bandaging. The following drink may be given every four or six hours:—

Prepared chalk	two ounces
Powdered gum arabic	half an ounce
Powdered catechu	two drachms.

Mix, in half a pint of thin starch, arrow root, rice liquor, or tripe liquor; and, in case the purging be considerable, not only give this by the mouth, but also mix the same with four or five quarts of rice or tripe liquor, or thin starch, and give as a clyster. If the diarrhœa should be excessive from the first, or should prove obstinate afterwards, add to the drench, powdered opium and powdered alum, half a drachm of each.

INFLAMED BOWELS IN NEAT CATTLE.

Both the varieties of this disease, already described as common to horses, are also not unfrequent among kine. The enteritis, or red colic of horned cattle, presents symptoms which do not materially differ from those; neither in all essential particulars is any variation in the proper treatment necessary: bleeding, opening the bowels internally, and stimulating them externally, being here also the principal means of cure.

The *inflamed purging state* is likewise not unfrequent among them, and derives its origin less from any external irritant than from a diseased state of the natural purge of the body, the bile; and to which form of the disease, from the greater complexity of their biliary structure, they are found peculiarly liable. The curative plan must be the same as detailed for the removal of the same complaint in horses, except when it is dependent on a mixed inflammation, partly phlegmonous and partly villous, as is the case frequently when the liver is concerned, and which may be known by the accompanying symptoms, betokening irritative fever; then the treatment must be more analogous to what is prescribed below for hepatitis.

INFLAMMATION OF THE LIVER.

TRUE Hepatitis is not a frequent occurrence in veterinary practice, for the liver of the horse is but seldom *primarily* affected with inflammation; though, when other great abdominal inflammations take place, then this often participates; and now and then also it becomes the immediate object of attack; in which cases the only difference between the symptoms and those of hepatitis are, that they are not quite so violent, and that there is usually a yellow tinge in the conjunctive, nasal, and buccal membranes. When it terminates unfavourably, it usually disorganises the liver into a grumous mass. It is mostly occasioned by some undue exertion: a few years ago several cases fell under my notice at the close of a very hot summer, in most of which extensive anasarca appeared. The cure should be attempted by the same means as are detailed in enteritis, but with the recollection that active purgatives may be administered with advantage. The following is a proper form, and should be repeated every four or five hours, until the costiveness which is usually present is overcome.

Submuriate of quicksilver *(calomel)*	one drachm
Antimonial powder	two drachms
Powdered aloes	three drachms.

Hepatitis is now and then accompanied with diarrhœa, in which case use the lancet sparingly, and give the following:—

Castor oil	four ounces
Gruel, or linseed tea	six ounces
Powdered ipecacuanha	a drachm.

By the help of the yolk of two eggs beaten with the oil, and the gruel added gradually, a smooth uniform mixture may be made, and which will be found peculiarly useful to amend the state of the evacuations, and should be repeated every other day, giving the following ball also twice every day:—

Powdered opium	half a drachm
Submuriate of quicksilver *(calomel)*	half a drachm
Powdered chamomile	half an ounce.

Mix with honey to make a ball. No apprehension need be entertained that the calomel will increase the diarrhœa, as the opium will sufficiently restrain it; observing, that should the disease be protracted beyond the third day, the calomel must not be persisted in, for fear of salivation; but instead, a course of tonics with steel may be entered on for four or five days, and then again have recourse to the calomel, &c., as an additional security against relapse. In other respects, as diet, clothing, &c. &c., treat as directed under Inflamed Bowels.

INFLAMED LIVER IN NEAT CATTLE.

From the increased complexity in the structure of the liver in neat cattle, they appear more subject to hepatic affections than the horse; but these affections in them are more usually of a slow chronic kind; nevertheless now and then acute hepatitis appears, with all the symptoms that characterize it in the horse. Both varieties of the complaint likewise are observed, but cattle are more subject to that which is accompanied with diarrhœa, from the greater disposition in them to accumulate bile by the presence of a gall-bladder. In either case the treatment must be similar to the corresponding case in the horse. (See *Diarrhœa* and *Jaundice in Cattle*).

I have never seen distinct hepatitis in sheep, though chronic affections of the liver are sufficiently common among them.

INFLAMMATION OF THE KIDNIES IN THE HORSE.

NEPHRITIS, as a primary disease, is not a very common complaint among horses; but by its fatal tendency, it becomes an important subject; and it is rendered still more so from the proper treatment not being understood by the common class of farriers. It has been said, that mares are more liable to it than horses, horses being more prone to inflammation of the neck of the bladder: but my experience has not justified this observation. Small as these organs are, they are very essential to life, and the quantity of blood passing through them is very great; therefore, we cannot wonder at their aptitude to inflame, nor the great derangement that inflammation occasions in the machine when they are so. I will commence with a case of nephritis which occurred in my own practice near thirty years ago, external injuries having occasioned it. A very heavy man, unused to riding, was sent express fourteen miles with a letter of much consequence, which he was ordered to deliver as soon as possible, and farther, not to wait at all, but immediately to ride back again. He did so, but the poor beast, as might be expected, was terribly distressed, and within half an hour I was sent for to see him, and a more pitiable object I hardly ever beheld. He alternately laid down, rolled on his back, groaned, and then convulsively started up again, bathed in perspiration, and groaning piteously. His attempts to stale were incessant, and each produced blood and urine. He did not outlive the night.

The *Causes* are exposure to cold; standing in the rain; water dripping on the loins I have known bring it on; a heavy awkward rider by his motions may bruise the kidnies; or even the action of the psoæ muscles in great exertion, and metastasis of inflammation[*]. Mow-burnt hay, musty or even kiln-dried oats, in common with other diuretic substances, too violent or too long continued, may any of them occasion it. It may terminate in resolution, suppuration, or gangrene.

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[*] A very valuable horse, which, notwithstanding a slight appearance of pneumonia on the 21st of January, 1807, had been ridden severely both on the 22d and 23d in rain, which was falling both days, was sent to my infirmary on the 24th, still ridden by the groom who brought him, to whom I

Symptoms.—Dull air; pain expressed by looking at the flanks; urine made frequent and in small quantities, often red or bloody, and as the inflammation increases almost wholly suppressed: still, by a sympathetic consent of parts, attempts are made by the bladder to evacuate, and the mucous secretion from the bladder and urethra only are pressed out. Pulse at first rather hard and frequent, and somewhat full; but, as the disease advances, it becomes smaller, oppressed, and intensely quick. The animal stands with his legs wide apart, as though going to stale, and shrinks when the loins are pressed. If it be an entire horse, the testicles are alternately drawn close to the belly by the cremaster muscles, and alternately pendulous and relaxed. To distinguish it from inflammation of the body of the bladder, or from that of the neck of that organ, the horse should be examined by passing the hand up the rectum; when, if the inflammation exists in the kidnies, the bladder, whether it contain any thing or not, will not be hotter than the surrounding parts, nor more tender: but should the affection be confined to the body of the bladder, it will be surely found empty, but very hot and painful to the touch: if again, the neck of the bladder, as sometimes happens, should be the seat of the disease, the heat and tenderness will be considerable, and the bladder will be found distended with urine. The horse shews much disinclination to move, and when forced out straddles in his gait.

The *Treatment* must be directed to the lessening the arterial action by liberal bleeding, as directed in diffused inflammation; and which should be repeated if necessary; back rake; throw up clysters; both with a view to promote a soluble state of bowels, and to act as a fomentation to the inflamed organs*; and if any costiveness be present, give an aloetic purgative without any diuretic substance intermixed†. It will be prudent also to endeavour to excite an external inflammation over the loins, but we are much confined as to the means of doing this; for the use of Spanish flies is here questionable, from an alleged disposition in

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made the remark, that I feared his being thus treated [illegible] day rendered it probable he was come [illegible]. [illegible] notwithstanding [illegible] the next day at 110, with evident uneasiness, but [illegible] looking round at his flanks. He had much thirst, hurried respiration, [illegible] with frequent [illegible] to make a small quantity of water, after which some blood [illegible]; which latter appearance did not last more than two or three days, while the small evacuations of high-coloured urine continued throughout. On the next day after his arrival the pulse was 110, he exhibited a great dislike to the smallest motion, the near hind leg and thigh became [illegible], swelled enormously, and, by the third night, was completely paralytic; and it is remarkable that the near fore leg was also more cold than the off. So completely was the motion of the hinder [illegible] that the animal never once changed his position, or attempted to lie down during the twelve days the disease lasted. On the 30th of January, this affected limb, however, returned to its [illegible], warmth, and capability of voluntary motion; but the off hind leg immediately became affected in a similar manner to that in which the near had been, and remained in that state for twenty-four hours, when the swelling and paralysis as suddenly again left it, and resumed its station in the near [illegible] leg and thigh, and remained stationary there until the death of the animal, which took place on the [illegible] of February. About four days before this, a considerable remission of symptoms took place, and I entertained hopes of his recovery; but this fallacious appearance lasted only a few hours, when he relapsed into a more aggravated state of disease; the pulse became irregular [illegible], delirium came on, and death closed the scene. A careful examination, [illegible] the previous information gained of the symptoms exhibited on the 21st, shewed that the lungs had been first attacked, as they still bore inflammatory marks; but that the [illegible] on the 22d and 24th had translated the affection from them to the kidnies by *metastasis*. The left only now appeared much diseased; but in this the inflammation had been so great, that it had become gangrenous, even to a state of absolute solution. The right was but little affected; though there is no doubt but that, on the 30th of January, a new metastasis had taken place, and that the disease had been translated from the left kidney to the right. The remaining viscera, as before mentioned, were healthy, and the inflammation had communicated itself to the parts around less than usual. The paralysis evident in this case may be accounted for, by considering that the inflammatory affection extended itself to the iliac nerves, which are situated in the immediate neighbourhood of the kidnies.

* The red water in cows has been successfully combatted by throwing up of clysters of cold water. How far might this prove useful in nephritis in the horse? It is, at least, worth a trial.

† We need not wonder at the fatality which attended this complaint, called by the farriers *red-water*, seeing that they, mistaking an effect (the suppression of urine) for a cause, set about the cure by strong diuretics, which of course aggravated the disease; even Bartlet, who copies from Gibson, when treating of this disease, directs that if the secretion of urine should continue suppressed, to give nitre, turpentine, myrrh, and balsam capivi. Now, as the suppression arises from the continuation of the inflammation, this stimulating treatment would probably urge the kidnies into immediate gangrene.

them to stimulate the kidneys[*]. Turpentine, for the same reason, should not be applied; but no such fear prevents the use of scalding fomentations, or of any diluted caustic: neither can any objection be formed to the application of a simple mustard poultice without turpentine, which may be renewed every two hours; and, if the poultice be applied upon a newly stripped sheep-skin, it will increase its activity[†]. Without any attempts at actual diaphoresis, which would increase the action of the heart and arteries, we should attempt to moderately determine the blood to the skin and extremities by clothing, friction, and bandaging up the extremities; as well also by moderately nauseating the stomach, either by aloes or white hellebore, as the case may indicate. Diluting liquors are inadmissible, on account of the distention they produce, for which reason the animal should be allowed but little to drink. And should it not be deemed advisable to try the full nauseating plan of subduing the inflammation, give the following:—

Powdered white hellebore	two drachms
Tartarised antimony *(emetic tartar)*............	one drachm
Powdered opium....................................	one scruple
Acetated liquor of ammonia (see *Mat. Med*).	four ounces
Chamomile tea	eight ounces.

Mix, and give every six hours.

RED WATER IN NEAT CATTLE.

Red water, which is the cowleech's and grazier's name for what it has been usual to consider as inflammation of the kidnies, is much more common among horned cattle than it is among horses: in them it is sometimes primary, and, at others, connected with an inflamed bladder: while again, in some cases, I have observed it accompanied with an affection of the bowels also. Graziers attribute it to low damp situations; or the eating of particular herbage is very generally assigned as a cause, which by their acrid qualities occasion lesion in the vascular secreting structure of the kidnies. It is also known to follow great alternations of temperature in a marked manner: in some instances it has been attributed to drinking impure water, particularly that which is found in peat mosses. These varieties make it not a little complex to the common practitioners: indeed, these cases are, in general, to them wholly incomprehensible, for one only circumstance arrests their attention, which is, that the afflicted animal has a difficulty in voiding the urine; and they immediately attempt to overcome this obstruction by forcing diuretics. In a celebrated publication on cattle we find, a quart of infusion of *pellitory* directed to be given two or three times a-day. Mr. Clater recommends *camphor*, *oil of juniper*, and *salt of tartar:* by which stimulating treatment these inflammatory affections were very commonly pushed into gangrene.

The *symptoms* do not differ from those observed in the horse: the urine, at first almost suppressed, soon becomes bloody, from whence its name: and as the disease advances, particularly if it terminates fatally, the urine becomes darker and of a brown hue. The *treatment* consists in bleeding largely, according to the state of the animal and the duration of the disease; and, if there be considerable marks of fever, give antimonials, but no nitre; as the following:—

No. 1.—Antimonial powder	a drachm
Powdered ipecacuanha	a drachm
Powdered chamomile	three drachms.

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[*] The injurious effect of cantharides introduced into the system by the means of blisters on the kidnies is, however, denied by M. Barthelemy, who instituted a set of experiments for the purpose of ascertaining the fact. (See *Cantharides, Mat. Med.*) Volpi asserts the same: nevertheless I should recommend, in preference, the other stimulants to the practitioner.

[†] A very active external stimulant may be made by macerating the croton tiglium in spirit, either of turpentine or of wine. (See *Blisters Mat. Med.*)

Make into a ball with honey, and give twice a-day. In some cases camphor and opium have been found very beneficial.

I have likewise seen this complaint exist in cattle in a less acute form, so as to last some weeks, sometimes originating in over-driving or blows across the loins, and not unfrequently from the effects of difficult calvings. In these more chronic cases there is seldom any necessity for bleeding: a warm charge applied over the loins is very proper, and the following drink may be given every morning:—

No. 2.—Powdered catechu	two drachms
Mucilage of gum arabic	four ounces
Lime water (see *Mat. Med.*)...............	six ounces.

In such instances a change of diet is also often useful: I have seen great and immediate benefits arise from being fed wholly on carrots, and also from a large warm charge or plaster over the loins*.

Sheep now and then have *red water* also, both of the acute and the more chronic kind: bleeding, housing, and feeding on any sweet root, as carrots, parsneps, or in default of these upon turnips, form the best means of cure, with the occasional use of one-third of the medicine No. 1, if the inflammatory symptoms be violent.

INFLAMMATION OF THE BLADDER.

THE bladder may become inflamed throughout its whole body, or the affection may be confined to the neck of it only; and as different symptoms arise, as either the one or the other of these are the immediate seat of disease, so we shall describe them separately. The different tunics of the organ, as the peritoneal, the muscular, or the villous, may either of them be the principal seat of disease. It is, however, rare but that the affections of the two former are conjoined; that of the latter is sometimes distinct; but our pathology is not yet sufficiently defined to accurately distinguish between the two former: we shall, therefore, proceed to consider the organ in an inflamed state generally. Cystitis is less frequent in mares than horses, and may be *caused* by all the circumstances which produce idiopathic inflammatory attacks on the other viscera; but is much more frequently brought on by active diuretic medicines too long continued, or by irritating injections thrown up the vulva in mares, to produce horsing. It may also be produced by a stone in the bladder.

The *symptoms* very nearly resemble those of nephritis: the urine is voided very frequently, and by sympathy dung also is often evacuated; and when the mucous surface is the seat of affection, the act of staling is almost constantly going on, from the irritable state of the inner surface of the bladder.

The *treatment* should be commenced by examining the state of the bladder by the rectum, which if full will give reason to suspect that the neck of the organ, if it be not the original seat, yet participates so much, that it will, for further guidance, be necessary to refer to the next article. If it be hot, empty, and tender, the case is clear, and will require the same means, in every respect, as are detailed in the former article, Nephritis, except, instead of blistering, foment the pubes very frequently with hot water. If there have not been sympathetic passing of dung, back-rake first, and then throw up clysters of warm gruel, or water, to foment the parts; and as soon as one clyster returns, throw up another. It might not be improper likewise, if the subject were a female, to pass up the urethra a decoction of linseed with gum arabic by means of a syringe, to sheath the bladder from the acrid urine.

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* A country recipe in repute contains armenian bole, salt, and a strong decoction of the common nettle: but I should fear the salt; and yet a veterinarian observes, that it is often subdued by bleeding and Epsom salts.

INFLAMMATION OF THE NECK OF THE BLADDER.

Sometimes the neck of the bladder takes on inflammation alone, and this occurs more frequently to horses than to mares. It is to be distinguished from inflammation of the kidnies, because in passing the hand up the rectum, the bladder will be found distended: this will also prevent mistaking it for inflammation of the body of the bladder: often the distention may be felt in the pubes. The frequent making of a little water will not, however, distinguish either of the foregoing complaints from this; as, in inflammation of the neck of the bladder, there is sometimes a small quantity of urine evacuated at different times: for after the bladder is distended, there will be, by the force of the distention, a few drops now and then squeezed out. But in this disease the frequent staling will not take place until the bladder be distended fully, whereas in the former disease it will come on at the very first: and likewise, in the latter case, the distended bladder may be felt even by the belly. The *causes* of this complaint we are in the dark about; but it may be reasonably supposed that the spasm of the part is occasioned by morbid irritation, and our opinion of the probable *termination* must depend on our capability of emptying the distended bladder, and recovering the lost tone of the organ. The *treatment* likely to attain these ends is by an early reduction of the inflammation: when that does not take place readily we must obviate the present consequences. To promote the first indication, bleed very largely, almost to exhaustion; open the bowels, throw up clysters, and stimulate externally, in the same manner as in the last two complaints. But if the inflammation do not subside sufficiently to permit the urine to pass, or the syncope it occasions do not relax the constriction, it must be drawn off by artificial means, or the bladder may burst; or the irritation alone may kill; or gangrene may come on. Attempt this by introducing the hand up the rectum, and gently force the fundus of the bladder forwards, which may open the neck. If this fails, the urethra must be opened by a catheter. In a mare, from the urethra being large and straight, a catheter may be easily passed up, and the water drawn off; but, in the horse, to effect this, an opening must be made from the perinæum; or otherwise we must proceed to puncture the bladder itself, as detailed below*.

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* The *introduction of the catheter* by the perinæum may be attempted, if there be but a reasonable chance of success, which we can best judge of by the examination of the neck of the bladder by the anus. Has the distention become very considerable? is the neck itself become very tumid and hard? and, above all, is the obstruction quite complete? which is, perhaps, of all other circumstances, that which should without hesitation determine us to puncture the bladder in preference to losing time and further irritating the animal by attempting the introduction of the catheter, which it is more than possible the strict spasm has closed beyond all prudent efforts to open. But of course, when the circumstances which should dictate this do not exist, we are warranted in trying to introduce the catheter, the mode of doing which is detailed with the operation of Lithotomy. *A puncture of the bladder* may be made above, through the rectum, by the introduction of a trochar; which should be one having its handle at a right angle with the penetrating part, which should not be more than two and a half inches in length; but in all other respects fashioned as trochars usually are. If this be plunged through the under surface of the rectum into the centre of the distended bladder, it will evacuate the urine without penetrating the peritoneal cavity (see *Peritoneal Reflections*, p. 213, and *Anatomy of Bladder*, p. 230); and as far as both my experience and my opinion go, this is the most eligible situation for the puncture. But as my object is to instruct the pupil, and never to lead him astray, so I would hold up to him every light, from my own feeble glimmer, to the blaze of the best authorities. I therefore quote Mr. Percivall's opinion, which is favourable to the lower puncture, to be made through the recti muscles, directly in front of the pubes, where it may be expected to equally escape penetrating any of the peritoneal reflections, and consequently will not enter the abdominal cavity. On these adverse plans Mr. P. remarks: 'Considering the horizontal position of the animal, and knowing the comparative facility with which these operations are performable, there exists no question in my mind which ought to be preferred; indeed, I doubt (for I never ventured upon the *high* operation) that the urine would be expelled through the rectum; whereas the dependance of the opening made in the front of the pubes singularly favours its discharge. Having once introduced the trochar, I would endeavour to confine it there by a contrivance of tapes and rollers until I could succeed in passing the catheter.' In the 4th vol. of *The Veterinarian*, I observe *a case of cystitis detailed, with observations on tapping the bladder*, by Mr. Cartwright. As the paper is evidently the produce of a veterinarian of no mean talent, I quote what bears on the present subject. 'In what manner,' says Mr. Cartwright, 'this operation ought to be performed there are divers opinions: Mr. Blaine recommends the bladder to be punctured through the rectum, and Mr. Percivall in front of the pubes; the latter doubting whether the urine would be expelled through the rectum, but acknowledging, at the same time, that he never operated through the rectum. Now, for my own part, I do not doubt but what the bladder may be, in a great measure, emptied through the *high* operation, for the bladder would scarcely ever be punctured but when it was fully distended; and I think that, so soon as the trochar has penetrated the bladder, the urine will begin to flow into the rectum through the elasticity and contractibility of the bladder, the usual method the horse has by contracting the abdominal muscles, thereby forcing the intestines against the bladder, as

It remains to add, that I have seen small continued doses of opium, as forty grains every two hours, greatly relieve this affection, and this in more than one instance: bleeding, also, till fainting was nearly produced, has relaxed the contraction.

INFLAMED BLADDER IN CATTLE.

This now and then occurs, though but very seldom. I have only heard it described, for I never saw the complaint; but it is evident that a corresponding treatment with that we have laid down for horses should be pursued. A singular variety of cystitis is common and destructive to the cattle of the south of France, particularly to sheep; and which the French shepherds attribute to their flocks feeding on broom (*genista*), from thence they name the disease *genestade**.

INFLAMMATION OF THE WOMB.

Hysteritis.—Our acquaintance with the morbid appearances produced by distinct inflammatory attacks on the several tissues of the different viscera is yet too much confined to enable us, in many instances, to do more, with any degree of safety from misleading, than to treat of a phlegmasia of the organ generally. A distinction undoubtedly exists between that which attacks its peritoneal and

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clearly shewn in this case, and which may be very much assisted by pressing the bladder with one's hand; and I think that, when part of the urine is evacuated, the bladder will have regained its capability of contracting, and that sufficient will be got rid of, so as for the means employed to remove the exciting cause. Even if all these probable means fail, it would be no difficult affair to bolster the horse sufficiently on his side, or even on his back, which would completely set aside the objection of the urine not being able to escape after the puncturing. In puncturing in front of the pubes there is very great risk of passing the trochar through the intestines, which I am pretty certain would have been so in the foregoing case, as they pressed up under the bladder to its neck. It naturally may be supposed, when the bladder is so much distended, as in this case, that it would have pressed the intestines away; but such was not the case, as I examined it very particularly. Besides, I think that, if the bladder could be tapped in front of the pubes, there would be great danger in the urine causing considerable irritation at the opening, from its pendant situation; and which is well known to be the case, even when the perineum has been opened, and which part is not near so liable to be so *repeatedly* irritated with urine as that made through the front of the pubes, which must be in constant contact with it. Again, Mr. Percivall says, that if we puncture the bladder through the recti muscles, the trochar will pass *behind* the peritoneal covering, leaving the abdominal cavity uninjured; but from several examinations, I conceive that it is impossible to avoid passing the trochar through the peritoneum; as I think it will be found that the peritoneum is reflected from the abdominal muscles into the pelvic cavity, and is nearly attached to the two ossa innominata, so that it would be impossible to pass the trochar without injuring the peritoneum. In operating through the rectum, these objections, I think, cannot arise, as I imagine there would be no danger of the opening of the rectum and bladder speedily closing. I do not see any great objection in passing a flexible piece of whalebone up the urethra as far as the perineum, and so cut down upon it and pass a female catheter direct into the bladder. I should even prefer this to puncturing in front of the pubes, although I am aware that there is great difficulty in getting the opening in the perineum to grow up; there certainly is great advantage in puncturing the perineum; for it is a part where we can easily get at, and can at any time introduce the catheter, or leave it in, just as we like. Upon the whole, therefore, if it should be found that the bladder can be punctured above the pubes without injuring the intestines and peritoneum, and and that the urine does not irritate the aperture, then I should say, by all means operate there; but if, after repeated examinations and operations, it should be found not to answer our expectations, then, I should say, operate through the rectum; and which, in my opinion, is to be preferred, until the above objections are found not to be well founded.'

* 'La cystite passe pour être epizootique sur les bêtes à laines, dans le medi de la France, ou elle est désignée sous le nom de *genestade*. Il est à remarquer qu'elle se manifeste presque tous les ans dans le cantons où les communaux sont plantés de genêt d'Espagne, où les habitans des compagnes sont dans l'usage de récolter une assez grande quantité de ce végétal, et de le donner comme aliment aux troupeaux pendant l'hiver. Le genêt produit le même effet quand il abonde dans les prairies où vont paître les animaux. Les bêtes à laine aiment cette plante; elles sont surtout friandes des gousses qui contiennent des graines; elles les préfèrent aux tiges, et se sont particulièrement ces graines qui occasionent, à ce qu'il paraît, la maladie, ou qui lui donnent plus d'intensité. Les moutons malades, de retour à la bergerie, se retirent à l'écart, et font de temps en temps quelques pas d'une manière lente; ils ne mangent plus, les yeux sont mornes, les oreilles pendantes, le ventre gros, et ces animaux se campent souvent pour uriner. Il existe, dans quelques uns, à l'orifice de l'urètre, une humeur épaisse et visqueuse qui ne peut couler, à moins qu'on ne glisse la main sur le canal dans la plus grande partie de sa longueur. Quand la mort doit avoir lieu, elle arrive ordinairement du deuxième au troisième jour. Lorsque les animaux périssent, ce qui n'est pas très rare, puisque la madadie tue le dixième au moins et quelquefois le cinquième de ceux qu'elle affecte, on remarque à l'ouverture tous les effets d'une forte inflammation de la vessie, particulièrement vers le col. Elle est ballonnée, et communément remplie d'urine jaunâtre et de mauvaise odeur. La membrane muqueuse présente des traces évidentes d'inflammation, notamment des taches dites gangréneuses, qui ne sont peut-être que des ecchymoses, et qui se voient particulièrement au sphincter. Cette phlegmasie paraîtrait donc intéresser spécialement le col de la vessie. Le plus sûr moyen de la prévenir serait de ne pas faire usage de genêt pendant l'hiver ni pendant l'automne, et, dans le reste de l'année, de ne laisser que peu de temps les troupeaux dans les champs qui en contiennent. Quant au traitement curatif, il ne diffère pas de celui qui a été indiqué précédemment.—*Hurtrel d'Arboval, Dict. Vet.*

fibrous portion and that which lines the cavity; but we cannot define it with precision. We know that the womb is liable to become inflamed by participation with extensive abdominal inflammations; with peritonitis, and with cystitis; but we know little of idiopathic *metritis*. It would undoubtedly produce symptoms not dissimilar in the mare not pregnant to nephritis, and to cystitis; and it must, in treatment, follow the rules laid down for the conquest of diffused inflammation. We know that it occasionally attacks mares after abortion, after difficult foaling also, when injudicious efforts have been made to produce delivery; in which cases it may follow as an ordinary phlegmasia; or it may possibly put on the appearance of puerperal fever. In the former case, it will be to be treated as above; in the latter, as already detailed under the head Puerperal Fever. In this form, however, it is very rare in mares, though sufficiently common in cows.

INFLAMMATION OF THE WOMB IN CATTLE.

(See *Puerperal Fever.*)

It remains only to notice, on the subject of diseases of this class, that the pancreas, the spleen, the omentum, and indeed any of the contents of the abdomen, may, and occasionally do, become the seat of *primary* or *idiopathic inflammation;* but our present knowledge is not sufficient to afford a correct symptomatology. That they become the objects of secondary attacks by participation with the inflammations of the larger viscera, we have constant proof. In the event of a primary attack, the proper treatment would not differ from that laid down for other abdominal viscera.

INFLAMMATION OF THE PERITONEUM.

Peritonitis.—The muscular, cellular, and mucous tissues of the various viscera can become inflamed, independent (at least primarily independent) of that membranous reflected covering which invests them individually and generally. In turn the peritoneum is occasionally itself the seat of inflammatory attack, both acute and chronic. The acute state may be brought on from any of the causes which produce visceral irritations; but the most frequent is that of a puncture or lesion of some of its parts by pressure, extension, &c. In such cases, the injured portion rapidly extends the inflammation to the parts around, sometimes to the whole peritoneal cavity, as is seen occasionally in castration, in uterine injuries inflicted in delivery &c.; but which phlegmasia must not be confounded with that of peritonitis present in puerperal fever, which is certainly of a different character, and more common in cattle than horses. The *symptoms* resemble those of enteritis in almost every respect, and the *treatment* involves also the same general intentions.

CLASS III.

INFLAMMATION OF MUCOUS MEMBRANES.

OF CATARRHAL AFFECTIONS OF THE AIR-PASSAGES GENERALLY, AND THEIR RESULTS.

ETYMOLOGICALLY speaking, catarrhal affections would designate an increased *flow* of the mucus supplied by any of the mucous membranes[*], but custom has applied catarrh to an increased excretion from the membranous linings of the nose, pharynx, larynx, trachea, and bronchiæ, when the effect of inflammation. But in the extent of surface engaged, the variable situations of the organs, and their different connexions, there must necessarily arise diversities in symptoms, progress, and terminations, as the whole becomes simultaneously affected, or as one portion is principally attacked. A general but slight attack on this extensive mucous surface, particularly of the pituitary portion, is known under the popular term of a *cold:* be it however understood, we have purposely separated this complaint from *epidemic catarrh*, already treated on, considering, and as we think justly, that epidemic diseases are the result of particular morbid influences particularly arising from miasm in the air, or taken from the ground under certain states, as one of constant humidity, or from particular effluvia from decaying vegetable matter, or from pestilential air passing over the grazing grounds of the beasts. Conveniently it is called among the profession *catarrh*. If it becomes more aggravated, and extends itself further into the air-passages, it receives other names, according to the principal forces of its attack; and as most of these produce sensations of either strangulation or dyspnœa, so we have now *cynanche* or *angina* superadded to the locality of the catarrh. Our subject may, therefore, be considered under the heads of catarrhus or common cold, angina parotidea, angina pharyngo-laryngea, and angina trachealis *vel* bronchialis.

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[*] ‘Réduit à sa véritable acception, le mot *catarrhe* ne désigne plus qu'un symptôme de l'inflammation, aigue ou chronique des membranes muqueuses. Cette inflammation, a reçu différens noms, suivant les parties qui en sont le siége; c'est ainsi qu'on l'appelle *angine* ou etranquillon, quand elle occupe la membrane muqueuse des voies gutturale et trachéale; *bronchite* ou *catarrhe pulmonaire*, quand elle réside dans celle des bronches; *coryza* ou *catarrhe* nasal, quand elle se développe à la membrane pituitaire; urétrite ou catarrhe urétral, quand elle occupe le canal excréteur de l'urine; *métrite* ou catarrhe utérin, quand la membrane muqueuse de l'utérus en est le siége; *catarrhe vaginal*, quand c'est celle du vagin, et catarrhe vésical, quand la surface interne de la vessie est irritée ou enflammée.'

CATARRH, OR COMMON COLD.

Catarrhal fever, as an epidemic or epizootic, has already occupied our attention; and it differs from the present subject principally in that it has for a remote cause a constitutional pre-disposition engendered in many horses at one time, dependent usually on the variable state of the atmosphere as regards heat and cold, dryness and moisture; and the prevalence of an easterly wind. The epizootic catarrh is also more severe, and produces constitutional derangement of more intensity and variety than the common and accidental cold taken at all times; the circulation is likewise more affected, the strength more prostrated, and anasarcous swellings are more common. *Catarrhus* or *common cold*, on the contrary, finds no such gregarious aptitude. The direct cause is here some *accidental sudden alternation* between cold and heat that is, in this case, either unusually applied or otherwise when it finds the constitution partially or generally, from certain causes, incapable of resisting its effects. In very young horses it frequently ends in *angina parotidea* or *strangles*, which variety will be treated of hereafter; and when its symptoms assume a more than ordinary intensity, it becomes *angina maligna*, already treated on in Class I, p. 289. A simple attack on the Schneiderian membranes, known as a *mild or common cold*, first shews itself by a thin watery secretion from the nose, and from the eyes also in some cases. The absorption of these acrid secretions of the mucous membranes irritates and inflames the lymphatic glands through which they pass, which therefore become tumefied and tender; symptomatic fever follows the inflammatory action; and the tendency observed in mucous surfaces to take on the formation of pus without ulceration begins, after two or three days, to shew itself, first by a coagulable deposit of lymph in a flaky form, and next by a regular flow of yellow muco-purulent matter from the nose: some cough is also usually present. In a few days these appearances vanish, and the horse is convalescent; or they become aggravated, and the detail must now be pursued in Epidemic Catarrhal Fever, from which in symptoms, terminations, and treatment, this does not differ.

ANGINA PHARYNGO-LARYNGEA, OR SORE THROAT.

To the above symptoms of common cold there are often added those which betoken sore throat; in which cases the inflammation has extended itself to, or perhaps primarily attacked, the mucous surfaces of the pharynx and larynx, by which the velum palati, tonsils, rimaglottis, œsophageal entrance, &c. &c. become affected also. The mouth is now hot, and at first dry: there is an evident disinclination to eat, or to swallow what is masticated: he therefore '*quids*' his hay, i. e. lets fall the masticated bolus, and sips his water, and moves it about with his lips rather than drinks it; or he utterly refuses it, unless held up to him. The region of the gullet and fauces is exceedingly tender and hot; the salivary glands throughout become swollen and tender; and from the laryngeal connexions the cough becomes frequent and painful. I would now refer for the remaining symptomatology and curative treatment to *Catarrhal Fever*, Class 1.

ANGINA TRACHEALIS AND BRONCHITIS.

When the catarrhal attack on the aërating passages extends beyond the rima-glottis and affects the trachea, it may, with propriety, be called by the first of these names*. When it extends into the bronchiæ or divisions of the trachea, it deserves the latter. In both there will be *hurried* and *embarrassed* breathing, and angina or sense of pulmonary obstruction in a greater degree than in the former affections alone; it will be accompanied by a rattling sound or wheezing noise during the respirative acts; with a muco-purulent discharge from the nose; a pulse at first harder and quicker than natural, but gradually becoming still more increased in frequency, but decreased in volume. During the progress of such a complaint we need not wonder if some diseased alterations of structure in the air-passages should be the immediate consequences; or otherwise, that such an irritable state of them may remain after the more active symptoms have ceased, as to give rise to ruinous chronic affections. The inflammation of the trachea may thus leave *roaring* as a sequel; and *thick wind* may result from angina bronchialis. For treatment, &c. &c. refer to *Catarrhal Fever* and to *Pneumonia*.

CHRONIC DISEASES OF THE PULMONARY AERATING PASSAGES,

KNOWN BY THE POPULAR NAME OF ROARING, CHRONIC COUGH, THICK WIND, BROKEN WIND, &c.

ROARING.

THE artificial habits of life to which we subject the horse occasion numerous morbid changes in his organs, but in none more than those connected with his respiration: and not only do the grand masses of the lungs suffer, but the very passages to them become altered in structure also, and rendered incapable of transmitting the air with its proper freedom: and the obstructing matter, on the principle of wind instruments, produces sounds modulated according to its figure and extent, which horsemen called *wheezing*, *whistling*, *piping*, *roaring*, *&c.*; terms sufficiently expressive, but not sufficiently well defined, even among those by whom they are conventionally used.

The *causes* of roaring, which I shall here use as a type of the whole, are remote and proximate. The *remote causes* are mostly inflammation, acute or chronic, in the tracheal tube itself. Occasionally it is brought on by the effects of inflammation on other parts, as of the salivary glands in strangles, or of those abscesses which not unfrequently occur in violent catarrh in the vicinage of the pharynx. Structural alteration in the lungs, as hepatization, has occasioned it. (*Percivall's Lectures*, vol. ii, p. 256.) Obstructions accidentally formed by exostoses, cicatrizations, &c., or extraneous substances lodged in the cavities leading to the trachea, may any of them occasion it. Barriere notices a case of roaring dependent on the lodgment of a piece of riband within one of the nasal fossæ; and Godine another, brought on by a displaced molar tooth. The *proximate* causes might, with propriety, include these accidental obstructions, but they are mainly to be looked for in an extravasation, partial or extensive, of coagulable lymph; which, becoming organised, forms a permanent obstruction. When it is extensively spread over the larynx, it produces wheezing; when it constringes the rimaglottis, a whistling sound is the consequence, and is often heard in our own respirations under catarrh: or in the ordinary respirations of some asthmatic persons. Whoever has handled the throats of many old horses, must have observed a hardened state of the larynx, which almost resisted all attempts to what is termed 'cough them.' This ossification of the laryngeal cartilages is not an uncommon cause; and a similar state in the cartilages of the trachea is productive of it also. A very common cause also of roaring is a band of lymph stretched across the tracheal tube; at others, an internal ring of the same matter simply diminishes its diameter. The obstruction is sometimes so considerable as to excite piping or roaring on the slightest exertion: in general cases, however, roaring is only exerted when forcible inspirations and expirations are made; for it is, I believe, equally produced by the one as by the other. Mechanical obstructions to free respiration may eventually be productive of roaring: the custom of tightly reining in our carriage-horses there is reason to think produces it often; and Mr. Sewell is of opinion, that the practice of using tight throat-lashes or neck-straps may lead to it. In furtherance of which opinion it may be recollected, that horsemen have a very general supposition that cribbiting ends in roaring, in thick wind, or in broken wind: may not the tight collar strap also here tend to the former of these affections? The custom of '*coughing*' horses, and so frequently as it is practised in fairs, may be readily supposed as a cause. A horse passes from fair to fair, having his unfortunate throat brutally pinched thirty or forty times each day. Is it to be wondered at if inflammation takes place, and adhesive deposit follow?

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* I formerly objected to this term, or rather to that of cynanche-trachealis used by Mr. Percivall; but my objection ought rather to have been to the want in human nosology of some specific name for that variety of angina or cynanche-trachealis known as the *croup*, which I and others regard as an inflammation *sui generis*; often raging epidemically, and entirely confined to children, the leading pathognomonic symptom of which disease is that of throwing over the mucous surface of the trachea a tenacious concretion of coagulable lymph, different from the mucous excretion formed in the common cynanche trachealis of adults. In my objection to the term cynanche trachealis, as the origin of roaring, or as a disease unknown in the horse, I should therefore have more specifically objected to it as identified with that human variety called croup (which Mr. P. himself observes is a disease of a different type), than to any incongruity in acknowledging its parity with the adult angina or adult cynanche trachealis, with which it is essentially similar; but from the other it is undoubtedly essentially distinct.

The *treatment* must be regulated by circumstances, but the principal indication is to remove the remote causes in the early stages, and to obviate the effects in the latter. If active inflammation be going on, bleed and blister; and if tumefaction of the neighbouring parts have occasioned it, attempt their reduction. Elevate the head as much as may be. Mr. Sewell recommends a seton in the neighbourhood of the obstruction when known; and in desperate cases he observes, that tracheotomy has been performed with considerable advantage; but the extreme difficulty of detecting the exact situation of the obstruction will prevent its being generally adverted to.

CHRONIC COUGH.

Coughing, considered as an action generally, is a violent effort of the diaphragm, intercostal and abdominal muscles, producing a forcible expiration of the air from the chest, with such violence as is intended to remove any extraneous body that may intercept the free passage of the air. Whenever it accompanies a general affection of the constitution, it is regarded as simply *symptomatic*, and the original disease is attended to for its removal. Thus catarrh and pneumonia are frequently accompanied by a cough, but we attend principally to the inflammatory state of the general circulation, as the best means of subduing it. A *chronic cough* is often symptomatic of some affection of the air-passages; it is also a very usual attendant on the states called thick wind and broken wind: it likewise accompanies glanders and pulmonary consumption; and appears when worms are in the stomach and bowels. But besides these cases, there exists at times, without any attendant difficulty of breathing (the horse at the same time eating well and thriving), a permanent cough, usually more considerable in the morning and evening, after meals, particularly after drinking, or on first going out to exercise. A cough of this description is very common, and it will remain in this state, without otherwise affecting the horse, for years, sometimes even his whole life. In other instances it does not end in so harmless a manner, but upon any occasional cold taken, becomes aggravated; and each cold makes it worse and worse, until at length, by repeated attacks on the bronchiæ, the ultimate ramifications become congested and thickened with coagulable matter, and the respiration or '*wind*' is at last permanently affected. An irritable state of the bronchial passages often remains after catarrh and pneumonia, which excites them into action on any change of atmosphere or temperature, and coughing occurs whenever the horse moves out of or into the stable; for the inspired air is colder or warmer than what was before breathed, and hence becomes a source of irritation: drinking cold water produces the same effect, for a similar reason; as does any hurry or irregularity of motion, because it propels more blood towards the chest, which cannot bear the increased stimulus. In some cases the irritability of the bronchial membrane itself does not seem so much increased, as that the mucus secreted from it appears altered, either in quantity or quality. It may become inordinate in quantity, as is often observed, and such horses, when they cough, throw off much of it by the nose: or it may be more acrid in quality, and hence by these means prove a source of continual irritation; or it may be lessened in quantity to the injury of the passages: and it is by assisting a return to the ordinary state of the secretions that expectorants act in relieving this complaint.

The *Treatment* of *Chronic Cough* must depend on our view of its causes and consequences. When it appears to arise from a want of mucous secretion, expectorants which excite such secretion are premised, as No. 1. When a redundancy of the mucous secretion is apparent, tonics are required. When the secretion is acrid, give No. 2. The cough, which is the effect of an irritable state of the parts, is sometimes relieved by stimulating the throat externally, and by giving internally opium with bitter tonics. (See *Mat. Med.*) In horses naturally of a full habit, and grossly fed, without sufficient exercise, our attempts must be directed to lower their general plethora, by bleeding, exercise, and more moderate feeding. If at grass, a less luxuriant pasture should be chosen. In the stable, such a horse should be muzzled at night, to prevent him eating his litter, and his water should be given in moderate quantities only: all sudden exertions likewise should be as much as possible avoided.

I have frequently seen chronic cough benefitted by a course of mercurial physic; but the affection in such cases was probably dependent on worms; and whenever a continued cough exists, with irregular appetite and unthrifty coat, stools fœtid and slimy, at one time loose and another hard and dry, it is more than probable that worms occasion the affection. (See *Worms.*) In all chronic coughs the best effect sometimes follow from feeding with carrots. Turnips, parsneps, beet, and potatoes, may be beneficially used where carrots cannot be got; and a mash with bran and linseed, or malt, may be occasionally given. In cases of this description, which may be suspected to be dependent on coagulable lymph deposited within the trachea or bronchiæ, the rubbing in of mercurial ointment the whole length, for a week, would be advisable, and then to blister the like extent of surface.

No. 1.—Submuriate of quicksilver (*calomel*)	one scruple
Gum ammoniac	two drachms.
Balsam of Peru	one drachm
Powdered squill	one drachm.

Make into a ball with honey, and give every morning fasting. In some cases the following has been found efficacious:—

No. 2.—Tar water (see *Mat. Med.*)	half a pint
Lime water (see *Mat. Med.*)	ditto
Powdered squill	one drachm.

Mix and give every morning, or try the following:—

No. 3.—Powdered ipecacuanha	one drachm
Camphor*	two drachms
Powdered liquorice	half an ounce.

Make into a ball with honey, and give every morning.

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* Mr. Garland, of Doncaster, informs us, that he has given camphor with much success in chronic cough; which, from its sedative qualites, might be expected: perhaps, in union with digitalis and hyoscyamus, it might be even more successful.

To either of the above may be also added, with benefit in some instances, as an additional expectorant, one or two drachms of *tartar emetic*.

THICK WIND

Is also a common consequence of either acute or chronic pulmonary inflammations. In some instances, it is the immediate consequence of violent or long-continued exercise, and particularly on a distended stomach and bowels, or after full drinking; or it may be brought on by the application of cold. It is often connected with a plethoric state, and is therefore very common among gross feeders, and where the exercise is not proportioned to the work; and more particularly in low-bred and thick-set horses. The *remote causes* are usually increased vascular action: the *proximate*, the deposit occasioned by it, which blocks up the air-cells, and thus interferes with the freedom of respiration. The post-mortem examinations of such cases exhibit, in some instances, a slight hepatization of lung, the consequence of repeated congestions in plethoric habits; in others, the minute bronchial cells are filled with adhesive matter, or the general parenchymatous substance may be pervaded with minute granulations of a blueish colour.

The *symptoms* of thick wind are sufficiently known to any one at all conversant with horses, and the rationale by which they are produced is not difficult to explain. The capacity of the air-cells being diminished, renders it necessary for the air to be more frequently taken in, because, being acted on by a less surface, the blood is not sufficiently oxygenated; and a sufficient number of air-cells not being expanded, a sense of fulness in the right side of the heart induces the animal to make hasty inspirations to remedy the defect, and consequently hasty expirations: the force with which these are operated, occasions the sound so well known as the distinguishing mark of thick wind. In this affection, the obstruction to both being equal, the inspirations and expirations are equal, which serves to distinguish it from broken wind, in which there is no obstruction to the *entrance*; and therefore the breath is drawn in with its usual facility, but is *expelled* with difficulty. Thick wind is, however, very apt to degenerate into that state termed broken wind; and the post-mortem appearances of such horses as have been examined under thick wind would readily, by an increase of the disorganization, account for the symptoms of broken wind: but it cannot be the hepatized lung that is changed into the emphysematous state.

The *treatment* of thick wind can seldom be more than palliative, as, once established, it remains permanent. In very recent cases, bleeding, blistering the chest, or mildly stimulating the course of the trachea and bronchia by mercurial frictions, to promote the absorption of any deposit, may be tried. These having failed, a preventive treatment should be adopted, calculated to avoid any increase of the evil, as in the treatment of broken wind. I have, now and then, witnessed benefit from repeated doses of mild mercurial physic.

BROKEN WIND.

This peculiar affection has long excited the attention not only of veterinarians but of the curious in general: and as a cure for it holds out the certainty of a plentiful harvest, both of credit and emolument, it has been a subject of much experiment and more conjecture. The older writers indulged in the most absurd and extravagant notions respecting it*; in the detail of which I shall not follow them. On the Continent it long occupied, in later times, the research of many eminent veterinarians, but with little satisfactory issue. It has been attributed to external and internal causes; to a defect and to a superabundance of vital energy; to altered structure of the heart, of the lungs, of the diaphragm, the stomach, the liver, &c. It is lesion with some, nervous with others, and simple distention with a third. Among our own writers the discrepancy is equally great: Gibson attributed it to an enlargement of the pulmonary mass generally; Dr. Lower to a rupture of the phrenic nerve; and in later times it has been mostly attributed by our writers to organic lesion. But to proceed somewhat methodically, we will cursorily inquire into its more probable causes, remote and proximate.

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* These sapients, observing the flatulent state of the bowels, suspected that the disease itself consisted in the formation of wind there; others, that too much air was received by the lungs; but both agreed that an artificial outlet either by a new anus, or by an enlargement of the old one, was a proper remedy; and a division of the sphincter ani being made, and the air passing away without noise, a cure was supposed to be made, although the wretched animal ever after presented the disgusting spectacle of fæces dropping involuntarily, and was as pursive as ever.

The *remote* causes of broken wind are hereditary or constitutional liability, as well as the remaining sufficiently long under the action of causes capable of exciting morbid changes in the respiratory organs themselves. A certain form of body is unquestionably favourable to its production, and it is from this circumstance that it proves hereditary. The narrow confined chest, and the pendant belly, which mark low-bred horses and gross feeders, all of whom are observed to be peculiarly liable to it, are predisponents, by confining the ordinate action of the lungs, and affording no reserve for the inordinate. It must be this defect in form which makes it more common in mares than horses; subjecting horses to a long-continued unhealthy course of feeding on dry food, as chaff, bran, barley meal, &c. &c. brings it on; or working in mills, where much dust is necessarily inhaled. It is seldom the immediate consequence of pneumonia; but frequently it results from those states of disordered respiration which succeed to it, as thick wind, chronic cough, &c. The *proximate* causes we are as much in the dark about: we see that it gradually steals on a horse, occupying months, and even years, in a slight occasional cough, which ripening into a state of slightly impeded respiration on exertion, at last ends in broken wind. We see it also follow one hard gallop; and we can leave a horse well one day, and find him broken-winded the next. With these facts in our every-day experience, can we readily name an universal proximate cause? We may truly characterise it as *a diseased alteration in the functional capacity of the bronchial ramifications.*

A *post-mortem examination*, in most of the subjects which have been inspected[*], has brought forward an emphysematous state of lungs, and which, had it been universal, we need not to have looked further for the cause; but, on the contrary, it is not by any means uncommon to meet with broken-winded horses whose lungs after death are neither emphysematous or otherwise structurally deranged; and which, with the exception of their lighter colour than natural, cannot be distinguished from the sound lung. It must, however, be acknowledged, that it is seldom they are seen thus free from diseased appearance; for if not emphysematous, they are hepatized, or congested; sometimes tubercular. From two cases cited by Mr. Percivall (and I have heard of others), emphysema of the parenchyma of the lungs can also exist without broken wind. If likewise a mechanical rupture of the air-cells was the universal cause of broken wind, it must be always sudden, or nearly so; whereas it gives some years of a warning cough, or of thick-winded wheeze so well known. Although, therefore, an emphysematous state of the lungs is common, it is by no means constant, and consequently will not afford a structural solution of this difficulty[†].

The *symptoms* of this complaint are well marked: the cough and the mode in which respiration is performed may be considered as pathognomonic. The sound emitted by the cough is peculiar to this asthmatic state, and is often forced out with a kind of grunt through the upper part of the trachea, in a short but vibrating feeble tone compared with the usual cough of sound-winded horses. The respiration is conducted with a remarkable difference between the inspirations and expirations. Inspiration is effected quickly and with the ordinary ease, because, as would be argued by those who favour the opinion that an emphysematous state of lungs is the sole cause of this æquine asthma, the air is supposed readily to find its way into the cellular tissue of the ruptured air-cells, where, becoming entangled, it occasions that remarkable difference in the ease with which inspiration is effected and the lengthened laborious effort of expiration, which, it may be observed. is performed by two distinct efforts, in one of which the usual muscles operate, and in the other the auxiliary muscles, particularly the abdominal, which are put on the stretch to complete the expulsion more perfectly; after which the flank falls with peculiar force, when these muscles resume their relaxations. An auxiliary symptom is the peculiar flatulence of every broken-winded horse, which is strikingly characteristic of that disordered state of digestion so common in these cases, and of that constant thirst also which is invariably present.

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[*] The air is in these cases extravasated, not only throughout the parenchyma, in minute aerial bubbles, but is also extended over the pleural covering, in vesicles both large and small; and is, in most cases, so complete as to make the lungs specifically lighter than ordinary, and to make them crepitate and crackle under the hand. They are also, in every instance, of a more pale colour than natural, in some cases being almost white; which may be accounted for, either by the disorganization having injured their vascularity, or by its admitting more light through its gaseous cells.

[†] The simplicity of this theory was so captivating, that at first few but would believe that some error had crept into the accounts, which detailed any other appearances in the post-mortem examinations of broken-winded lungs: but subsequent cases have fully proved that such do occur; and that the true theory of broken wind is not yet altogether developed, although we are still inclined to think that this state best accounts for that well-known difficulty in the expulsion of the air in respiration. As the diaphragm has been found ruptured in some broken-winded horses which have died suddenly, that also has led some to suppose that a *partial* lesion of this septum existed in most cases; but it is the additional force applied to it, under great exertions to assist the morbid lungs, which produces a mechanical lesion of its disk.

The *treatment* of broken wind can seldom be more than *palliative*. Whatever increases the distention of the vessels generally, as a state of plethora, or of the stomach and bowels particularly, aggravates the complaint by increasing the difficulty of expanding the lungs. Therefore, avoid stimulants, and promote regular evacuations by the bowels; abstain from over-distention of the lungs by too violent and too sudden exertions, particularly after eating; for the food, although it may be supposed to pass the stomach quickly, yet is retained longer in the large intestines, which equally press on the diaphragm. By carefully attending to these principal indications, a broken-winded horse may be rendered comfortable to himself and useful to his owner. The food should be regularly given in moderate quantities only; but most particularly it should be of such a nature as will contain much nutriment in a small space: hence corn is more proper than hay, and, above all, I have found a manger food composed of one part bran, one part bruised beans, and two parts bruised oats, agree particularly well, given somewhat moistened, as indeed all the food given to a broken-winded horse should be. On a sufficient quantity of this food a horse will need but very little hay, and what he does have should be of the oldest and best kind, and principally given at night as a condiment to the corn. When they can be got, give also carrots, mangel wurzel, Swedish turnips, parsneps, or cooked potatoes, which feeding will be found to combine both medicine and nutriment, and render little water necessary. Turning out to grass commonly aggravates the symptoms of broken wind; but a daily run on a very short pasture is generally found advantageous, and a neglect of moderate exercise aggravates the complaint greatly. water should be sparingly given, particularly in the working hours; at night, a moderate quantity may and should be allowed, but on no account let the broken-winded horse drink his fill at a pond or trough. *Medicinally*, it may not be improper to bleed when the occasional symptoms run high; and benefit has been received from daily doses of foxglove under these circumstances. I have also administered antimony and nitre with advantage.

Modes of distinguishing Soundness and Unsoundness of the Wind.

These various affections of the *wind* are very important to the veterinarian, nor can he be too well informed of the appearances that characterise each distinctly; because, as their existence affects the legal soundness of horses, so he will be very often forced to decide peremptorily on very slight appearances. To *detect thick wind* it is generally necessary that some time be spent with the horse; and it is often requisite that he should be examined under various circumstances. Does he bear moderate exercise immediately after eating or drinking without blowing high? Does he cough in so doing, or is he observed to do it on every change of position, or temperature; particularly after drinking? And does he when in the stable, field, or when completely at rest, occasionally cough short, hollow, and not followed by that firm effort we call *clearing* afterwards? In such a case the horse has *chronic cough;* and as his breathing is more or less accelerated beyond the ordinary standard, he is more or less *thick winded* also. *Roaring* may be immediately detected by a brisk gallop; but the person who is to judge of its existence should be on the ground, and the horse should pass him several times, but without restraint; for I have seen horses whipped into a momentary cessation of the roaring.

Broken wind can hardly be mistaken; the cough accompanying it conveys a peculiar sound; it is short, vibrates within, and is combined with a grunting effort, more particularly observable on any sudden motion or surprise: to produce which, dealers hold up the horse's head, and then either strike, or pretend to strike, him suddenly, or kick him, which usually elicits this peculiar grunting sound. The breathing is hurried in the extreme by exertion, and is remarkable by being made up of *three* efforts instead of *two*. In the first, the air is drawn in naturally, and the flanks fill up as usual; but in the next, the falling of the flanks again to expel the air is most unusual; for it is not done with a gradual contraction of the muscles, but takes place at once by a momentary effort; and then a third action takes place, which is a slow but strong drawing up of the muscles of the belly, as though to press out remaining air. Broken-winded horses are also observed to be peculiarly greedy after water: and a little hurried motion distends the nostrils, and produces evident distress.

GLANDERS.

THIS fatal and loathsome disease has long been the scourge of this noble race of animals, as it remains the *opprobrium medicorum* of the veterinary art; and there is yet reason to fear that some time may elapse before we shall find its antidote; for we have records of its constant fatality of more than fourteen centuries' continuance. Hippocrates is said to have given his testimony to its incurable nature, and Vegetius describes as fatal complaints both glanders and farcy; the former as *morbus humidus*, the latter as *morbus farciminosus*. Blundevill, Markham, De Gray, Mascal, Snape, &c. treated of it; some of them viewing it in the light of a particular poison; others as an attack on some of the viscera, an affection of the spinal marrow, &c. &c. Sollysel, who lived towards the close of the sixteenth century, was an acute French writer, and described this disease as consisting of several varieties, including all muco-purulent discharges by the head whatever, which he attributed to an acrid humour invading these parts. Garsault, following in the same track, attributes glanders to strangles imperfectly cured. Gibson and Bracken appear to have formed no very distinct notions of either glanders or farcy; the latter, however, denied the contagious qualities of glanders, and recommended stimulating injections for its cure. In 1749, La Fosse the elder, before the Academy of Sciences, in Paris, presented a memoir, which had for its object a disproval of the humoral pathology as regarded glanders; on the contrary, he undertook to prove that glanders was purely a local disease, seated in the Schneiderian membrane, and proposed as a cure, to inject the whole surface of it by openings made into the frontal, nasal, and maxillary sinuses. His son pursued similar investigations, but without increased success. Bourgelat combated the opinions of La Fosse, as being untenable, but returned to the humoral pathology of the blood and humours to account for it. Dutz and Paulet considered both glanders and farcy as originating in a poison of a parallel nature with syphilis. Chabert adopted the rationale of Sollysel. Gilbert considered glanders in a similar light with strangles; glanders being nothing more than strangles degenerated and prolonged. Sainbel took up the opinions and practice of La Fosse; and thus his experiments in Lyons, detailed here after his death, exhibit a series of nasal injections, united with antimonial and mercurial preparations by the mouth, which only afforded additional proof of the inveteracy of the disease. When Mr. Coleman assumed the academic chair, new inquiries into the nature, causes, and treatment of glanders and farcy were made: and the activity with which they were conducted by so acute an agent gave reason to hope the best results: and if we do not yet boast our conquest of the foe, we have gained a clearer insight into the nature and causes of the disease*. Mr. Smith, veterinary surgeon to the 2d Dragoon Guards, in 1813, published a treatise on glanders, very highly spoken of by Mr. Vines; in which, though the contagious nature of the disease is not denied, it is thought as by no means considerable. We gather that its causes are considered to be debility, previous disease, impure air, cold applied in the form of a current, or taken by drinking cold water when hot, transition from cold to heat and *vice versâ*, and infection: from which it is evident that he is no advocate for the specific nature of the disease. The later French authors who have written on glanders are principally Rodet, M. Godine, jun., and Dupuy, whose work excited particular interest†. The year 1830 produced a work on glanders, by Mr. Vines, anatomical teacher at the Veterinary College, from whose known abilities and opportunities the profession were led to expect much; and as opposing conflicting opinions elicit just views of a subject, so we would recommend the student carefully to compare the opinions of Mr. Coleman and Dupuy (as both are fully detailed in Mr. Percivall's excellent Lectures) with this work of Mr. Vines', and we venture to predict that he will not regret his labour‡.

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* Mr. Coleman considers glanders as divisible into acute and chronic. *Acute glanders*, like other acute diseases, runs its course without intermission, and ends in death: it is characterised by ulceration of the pituitary membrane, the consequence of a *specific* inflammation, and is attended with tumefaction of the lymphatic glands. It is contagious, and communicable through the medium of contaminated stables, and by inoculation. Though it has occasionally its origin in contagion, it much oftener owes it to a poison bred and diffused in an atmosphere laden with noxious gases from dung, urine, and perspiration, emitted in hot, foul, and close stables; and which being proved, verifies the assumption that glanders and farcy have a spontaneous origin, and can be produced without the agency of contagion. Its contagious nature is, however, not denied by the Professor: on the contrary, it was altogether proved, as well as its constitutional state, by the celebrated experiment of producing glanders in an ass by the injection of the blood from a glandered horse into his veins. The acute glanders Mr. Coleman considers, in regard to the nature of the poison, as the same disease with farcy and chronic glanders; but his opinion of the affinity of the last is not so confirmed as in respect to farcy. Mr. Percivall, however, very justly remarks on this, that their *essential identity* appears proved by direct experiment. *Chronic glanders* commonly affects *but one side of the head*, and ulceration of the membrane is not necessarily present; but, on the contrary, its absence rather helps to keep up the true chronic character of the disease; for as long as it remains thus it will not kill; and from hence it has been likened to gonorrhœa, which will in time cease spontaneously. The appearance of matter from one side of the head is said to be a strong presumptive evidence of the presence of chronic glanders, and a proof that such matter cannot come from the lungs, but must proceed from some part anterior to the larynx. 'In some cases, however, the flux comes from both nostrils; here, commonly, both sets of glands are tumefied the nature of which swellings will serve to direct the diagnosis; in addition to which, most probably, the animal's health continues good, and the discharge is not offensive.' It would appear from this and from what follows, that Mr. Coleman considers pulmonary affection as the true distinctive difference between chronic and acute glanders; and yet, in the previous account which Mr. Percivall renders of the nature of acute glanders, we cannot gather that pulmonary affection constituted a necessary and leading character of the acute variety, as intended by Mr. Coleman; and as Mr. Percivall is our only authority on the opinions entertained by this eminent professor, I do sincerely regret that in his account he did not use all his accustomed precision. I would nevertheless strongly recommend the reader who has not access to the fountain head (the Veterinary College), to study the summary of the Professor's important opinions on glanders, as detailed in Mr. Percivall's Lectures. It only remains to add, that on *farcy*, Mr. Coleman's opinion appears to be that it owns one common poison with glanders generally, and that, of the three affections, it affords the most conclusive evidence of the production of the *poison* in the absence of contagion. In nature he considers it an inflammation and suppuration of the superficial order of absorbents, the deeper order not appearing susceptible of the irritation.

† The public are principally indebted to Mr. Percivall, also, for bringing this gentleman's writings before the English reader, where they now likewise occupy much attention. M. Dupuy is one of the veterinary professors at Alfort, and his celebrated work, which appeared in 1817, had for its object to shew that glanders had its origin in tubercles, which form in the various tissues of the body, and which he considers to be hereditary. These tubercles first form and multiply, next grow soft, disorganize, and ulcerate; and according to their situation so are the symptoms of the disease developed. The miliary tubercle is the most usual, and its ulcerative process in the pituitary membrane is marked by minute excavations, like pin-holes, but with shallow cavities and indented edges. The septum is frequently covered with them, and the ulcerative process extends throughout all the nasal cavities. When the lungs are also tubercular, there are cough, debility, catarrhal symptoms, œdema, with cracks in the skin; and now farcy makes its appearance. Farcy our author regards as a scrophulous affection, and the buds as scrophulous tubercles, which leads him to consider the glanders as a species of phthisis pulmonalis. M. Dupuy insists much on a particular form of body as favourable to the formation of tubercles, which becoming acted upon by cold and humidity, generate the disease, and which he maintains is the reason it is unknown in hot climates.

‡ Mr. Vines prefaces his own opinions of the nature of glanders thus: 'all the symptoms of disease which constitute glanders and farcy, invariably depend upon the unhealthy state of the system into

My further account of the nature of glanders and farcy will be short, as the prevailing opinions on the subject may be gained by a reference to the notes. Glanders and farcy we have reason to believe are but modifications of each other, and that both own one common poison: innumerable facts and well conducted experiments have set this matter beyond doubt; for horses have been inoculated with the matter of farcy, and glanders has been the result: glanders has also been produced by inoculating with the matter of glanders: farcy has been brought on likewise by inserting the matter of farcy: and, lastly, the artificial introduction of the matter of glanders has occasioned a true appearance of farcy. The opinions have long been divided on the claim that these diseases have to the name of *specific* affections, or rather as to being modifications of one *specific poison*. Some altogether deny any such claim, and, on the contrary, argue that glanders and farcy are but consequences of other inflammatory attacks; and that these diseases can even be produced *artificially*, by means foreign to contagion or any individual poison[*]. In answer, I would remark, that it is the very essence of all poisons to be governed by their own laws, and to own only certain modes of operation. Small-pox, cow-pox, syphilis, and the rabid poison, the symptoms of all which, as well as the terminations and modes of propagation, with the exception of the cow-pox, have remained the same for ages. I have always, therefore, myself, felt convinced of the specific nature of this affection, which for variety in its mode of production[†], continuation, and termination, has no parallel; and to which only we can attribute the unsettled state of the opinions concerning it, but which do nothing to unsettle its claim to the character of a *direct and peculiar poison*, which can always beget its like, and its like only. If the matter of farcy and the matter of glanders could produce at one time grease or strangles, and at another mild catarrh, I might doubt; but when I find nothing but the same type of disease follow from the infection, I can only consider such infection as one *sui generis*.

The forms of glanders have been called *acute* and *chronic*. A very ingenious veterinarian, Mr. James Turner, has proposed a third, which he would call the

which it is reduced or brought, and not, as is generally supposed, from a *specific poison* contained in the blood. And these symptoms of disease are found to depend on, and arise from, a variety of causes, whether they occur at the latter states or stages of common healthy inflammatory diseases, which take place, either directly or indirectly, in different parts of the body, such as strangles, common colds, distemper, inflammation of the lungs, grease, dropsy (anasarca or œdema), injuries, &c. or whether they arise independently of such disease. For when the system is brought into an unhealthy and a more or less debilitated state from neglect, or by the improper treatment of any of these diseases, and the following symptoms occur, they then constitute glanders or farcy. And as these symptoms only indicate the unhealthy state of the system when they follow such common inflammatory diseases as we have just named, they may be regarded as ending in, or becoming glanders or farcy. But, nevertheless, there are many instances where the symptoms which constitute glanders and farcy take place totally independent of common inflammatory and unhealthy diseases; but even then, the symptoms likewise depend upon the unhealthy state which the system is in previous to and at the time of their appearing or taking place; and consequently the system must ever be in an unhealthy state for the symptoms of glanders or farcy to shew themselves. Under this view of the subject, then, it must appear that glanders and farcy are nothing more nor less than terms indicating unhealthy disease of certain parts of the body, particularly those of the mucous membrane which lines the nose, the substance of the lungs, the skin, and the cellular membrane underneath.' In the prosecution of my subject, I shall have occasion further to notice the most important part of this work in the treatment of the disease: I shall only add here, that the theory is manifestly that of Sollysel, and is open to much discussion on many of its points. In attempting the complete overthrow of our present opinions, it may be questioned whether this ingenious author has not, by going too far, rather defeated himself. *Festina lente* would have been proper here.

[*] In all candour we must even allow that the tide of popular opinion is setting against not only the specific nature of this disease, but of that of other specific affections. Gilbert is very severe on those who consider these as specific affections, and affirms that glanders is no more than imperfectly developed strangles. Mr. Vines is little less so, and says, that 'a specific poison is an imaginary idea, and founded in error, neither is a distinct disease;' but if properly investigated, it will generally be found to be only the latter stage of a common inflammatory disease of the mucous membrane which lines the nostrils, cavities of the head, throat, trachea, bronchial tubes, and substance of the lungs. Neither does he allow any proof of the nature of a specific poison in the matter of glanders and farcy, from the fact that introducing blood from a glandered horse into the veins of a healthy ass will produce glanders in such ass; for, he observes, he has produced both glanders and farcy by introducing the blood of a rabid dog, and that similar effects will follow the introduction of any irritating fluid into the circulation.

[†] Allowing that the other poisons alluded to are now almost spontaneously generated, this we know can be and is so: in the Quiberon expedition, close confinement, by shutting down the hatches in a storm, glandered nearly all the horses on board the transports.

insidious[*]. This attempted addition alone shews that the true lines of demarcation are not always easy to define: and even with this additional boundary, we shall find many cases without the pale. The disease is, however, marked with different degrees of malignancy, in some cases running its fatal course in a few weeks, and in others continuing for years with little alteration, and perhaps spontaneously disappearing at last; and under this view there is room for a systematic division into acute and chronic: that which Mr. Turner calls the insidious, is but a slight modification of the latter; but when we attempt to draw a distinction from the absence either of pulmonary participation or the originally innocuous nature of the attack, we find ourselves unable to pursue the distinctive features with sufficient accuracy. Acute glanders are seldom clearly marked but when they are the effect of some extraordinary circumstances, acting on a number of horses at the same time, as in a state of unusual deprivation of pure air. Asses and mules afford the most complete instances of acute glanders; they seldom have any other.

The *causes* of glanders and farcy have occasioned as much diversity of opinion as the nature of the complaints. Both glanders and farcy originate in *contagion*; and *infection*, in its *strict sense*, is a cause of the acute glanders, at least[†]. An hereditary defect in the structural capacity of the aërating organs, there is great reason to suppose, is a remote cause of much importance in glanders[‡]. Whatever acts noxiously on the air-passages for a considerable time, by its irritation, fits them to receive it also when an occasional cause is applied; and thus either acute or chronic glanders may arise, as the cause is active or insidious. In this way it is that the impure air of close confined situations probably acts, and in a twofold way, as topically, on the surface of the membrane, and constitutionally, by depriving the lungs of pure respirable air. In populous towns and cities, in crowded unventilated stables, we therefore meet with these diseases in the greatest numbers and worst forms. The debilitating effects of common inflammations of the mucous surfaces of the air-passages and their dependencies, is a common source: even wounds of these parts have brought on glanders. Dry food has been stated as a cause: a remote one is a cold humid state of atmosphere; and thus it is more frequent in winter than summer.

The *contagious* nature of glanders has been altogether disputed by some. Bracken was among the number: but many more think it only contagious in a slight degree. Mr. Coleman, Mr. Sewell, and Mr. Vines are, I believe, of this class; and the proofs for and against the degree of its aptitude are so contradictory, that, while we maintain the full effect of contagion, we must admit the anomalies in the proofs,—How is the contagion propagated?

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[*] In the clearing off of catarrh, influenza, &c. a protracted gleet remains from one or both nostrils, watery, with small particles of mucus or pus, sometimes of froth, invariably in very small quantities, but constant; and instead of a large submaxillary gland swelled to the size of a walnut, which lead to suspicion in these cases, it is enlarged only to the size of a pea or horse-bean, but is indurated, and is frequently loose and not adherent to the jaw bone. Another deceptive circumstance is the general state of the condition, which is that of good health, in coat, flesh, and spirits. In this state no one suspects glanders, and yet at any time inoculation with this matter will produce glanders in another horse. Mr Turner deserves the thanks of the profession at large for putting them on their guard against this treacherous disease, whose Protean shapes require all our vigilance; but, as he candidly observes, it is not a new species of glanders, but the true chronic form in one of its most occult shapes, of which we have too many instances.

[†] Although these terms are frequently used synonymously, and that without impropriety, seeing that in the genera of contagious diseases of Dr. Hossack, and since adopted by Dr. Mather Smith, genus 2 takes in such as are communicable both by contact and by the atmosphere; yet in this instance I conceive it would be convenient to confine *contagion* to its etymological sense strictly, and to consider it as characterising such diseases as require actual *contact* for their propagation. And by *infectious* diseases, such as are engendered by miasma or morbid exhalations from the decomposition of animal and vegetable substances (but here principally from the former), and which in the human subject create putrid fever, and in the horse malignant glanders.

[‡] *De l'hérédité de la morve.* L'influence héréditaire n'a pas encore attiré assez l'attention, dans les circonstances du developpement de la morve, pour qu'il soit possible d'en rien préjuger de positif. Suivant les auteurs modernes, l'hérédité n'est pas douteuse; Dupuy a même fait, relativement aux jumens et aux poulains morveux du haras d'Alfort, des observations qui tendent à prouver que la morve est héréditaire: cependant d'autres prétendent connaitre des expériences qui prouvent que non. Tout ce que nous pouvons faire dans ce doute, c'est de renvoyer aux considérations générales déjà exposées au mot Héréditaire; nous pensons qu'elles peuvent s'appliquer au cas dont il s'agit ici.

Mr. White's experiments would lead to a belief, that the simple contact of glandered matter, applied to a surface neither abraded nor inflamed, will not produce it. It has even been put up the nose, and retained there, without occasioning any ill effect. I have also rubbed the matter on various parts of the body, and introduced it under the eyelids likewise, yet no ill consequence ensued: but on rubbing some glandered matter into the greasy heels of a horse condemned to the dogs, farcy soon appeared. On the contrary, Professor Peal says, 'the glanderous matter is frequently conveyed from the nose of a diseased horse to one that is sound, whereby the effect of inoculation is most commonly secured;' and a similar result has many times since followed the same experiment. It must be remembered, that there is a non-susceptibility in some constitutions, and also in the same constitution at some times to receive it, when at other times, and in the same constitution, it would be readily taken in, to which much of this discrepancy of statement is owing. The infectious nature of glanders has been alleged and denied; but the question is at once set at rest by the breaking out of acute glanders, as a medium of contagion, among the horses on board the transports bound for Quiberon, in consequence of the necessity of fastening down the hatches for three days during a storm: but I do not admit that a single horse can infect the air around, so as to give the disease to a healthy one near him; horses have lived thus together for months without injury: on the other hand, I would not venture to deny the possibility of it, particularly that a sound horse, shut up in an unventilated stable, where the air became contaminated with the respired air of several glandered horses, might not himself become infected[*]. In its general character, therefore, it is more contagious than infectious, etiologically and etymologically speaking; and its contagious nature is principally exerted by the actual application of the morbid virus to some part of the body of the uninfected, in the production of the disease[†], and that generally to an abraded surface.

The *Symptoms of Glanders* are, an increased secretion from the membranes of one or both nostrils[‡], which continually flows in small or large quantities. This discharge is seldom at first perfectly purulent, but is more glairy, thick, and not unlike the white of an egg, and it sometimes continues thus for a long time; at others it hastens to become muco-purulent, and then purulent; but there always remains a peculiar degree of viscidity and glueyness in it that sticks the nostrils together, as it were, from its tenacity, differing from all other mucous or purulent secretions, the very nature of which strongly characterises the complaint. The

[*] It is a common observation, that such stables are most prone to it where grease prevails to a great degree, and, by some, grease has been supposed to be one of its origins; nor can we deny that the farcied form has supervened on bad cases of grease without known contagion. But what is here meant is, that living in a foul, putrid atmosphere, increases the susceptibility to the disease fourfold.

[†] The able writer on the *horse* in the *Farmer's Series, Library of Useful Knowledge*, says, 'Glanders, however, are highly contagious. The farmer cannot be too well aware of this; and, considering the degree to which they often prevail, the legislature would be justified in interfering by some severe enactments, as they have done in the case of the small-pox in the human subject. The early and marked symptoms of glanders, is a discharge from the nostrils of a peculiar character; and if that, even before it becomes purulent, be rubbed on a wound, or on a mucous surface, as the nostrils, it will produce a similar disease. Glanders are not communicated by the air or breath. If the division between two horses were sufficiently high to prevent all smelling and snorting at each other, and contact of every kind, and they drunk not out of the same pail, a sound horse might live for years, uninfected, by the side of a glandered one. The matter of glanders has been mixed up into a ball, and given to a healthy horse, without effect; yet in another experiment of the same kind, the poor animal died. The mouth or gullet had probably some small wounds or ulcers in it. Some horses have eaten the hay left by those that were glandered, and no bad consequence has followed; but others have been speedily infected. The glanderous matter must come in contact with a wound, or fall on some membrane, thin and delicate like that of the nose, and through which it may be absorbed. It is easy, then, accustomed as horses are to smell each other, and to recognize each other by the smell, eating out of the same manger, and drinking from the same pail, to imagine that the disease may be very readily communicated. One horse has passed another when he was in the act of snorting, and has become glandered. Some fillies have received the infection from the matter blown by the wind across a lane, when a glandered horse in the opposite field has claimed acquaintance by neighing or snorting. It is almost impossible for an infected horse to remain long in a stable with others without irreparable mischief.'

[‡] I believe that no reason has yet been attempted to be offered why a preference is given to the left nostril, which is so frequently the seat of the disease in chronic glanders (in the acute form the discharge is bi-nasal), that out of eight hundred cases which came under the notice of M. Dupuy, one only was affected in the right. English veterinarians have not, however, marked a preference equally great; but it is certainly very commonly confined in these cases to the left nostril, and the reason of this speciality is well worth the consideration of the pathologist and physiologist.

general colour of the Schneiderian membrane becomes changed; first to a violet colour, often a dingy yellow, and afterwards to a leaden hue. As ulceration takes place, the discharge becomes tinged with shades of green and yellow, intermixed with bloody stripings, and is often sanious and offensive, which is always the case when the bones become diseased. From absorption of the morbid matter by the lymphatics of the part, the maxillary glands under the jaws, through which these vessels pass, become swollen and tender, and, when one side of the head only is affected, the lymphatic gland of that side, and that side only, becomes somewhat tumefied. The enlargement of these glands, called by farriers *the kernels*, is too much relied on as an absolute criterion of the existence of glanders; for though, when the disease has existed some time, they are very generally tumefied, yet, in mild cases of some standing, they are not invariably so: and again, there are other complaints beside this that will tumefy them; whatever inflames the Schneiderian membrane, as catarrh, strangles, &c. may do it. Neither can a *certain* criterion be drawn from their attachment to, or detachment from, the bone: occasionally they will remain unaffected, or the whole will form a tumid mass, tender, but not adherent to the maxilla on either side. It is, however, seldom, when the disease is fully formed, and always, when it has attained any virulence, but that a distinct lymphatic glandular knob or two will be found in close contact with the inner branch of the jaw-bone of the affected side. The disease sometimes remains long without producing ulceration in chronic glanders, and cases of this kind prove very puzzling to the practitioner: at other times, on the contrary, an ulcerating process quickly appears; in the acute invariably. The ulcers of glanders have a very peculiar character, and their appearance cannot be too attentively studied by the veterinarian: they usually commence by minute limpid bladders, which soon form small ulcers, internally deep with abrupt prominent edges; and are seen in greatest numbers on the septum nasi, following the course of the lymphatics, and sometimes uniting into broad continuous patches, which spread and deepen until the bones are eroded, the cartilages absorbed, and the purulent secretion fills the ethmoidal cells. Sometimes the ulceration exists so high up the nasal fossæ, that it is very difficult to discover; yet, with the head held up to a full light, more particularly towards the sun when shining, it may be detected if within any moderate distance; and when it cannot, the varied appearance of the discharge will bespeak it. The junior practitioner must not, however, allow portions of the secreted matter which may adhere to the surface to mislead him into a belief of existing ulceration; he should, when in doubt, pass up his finger, or a probe armed with tow, and wipe away such; and had not the error actually occurred in the practice of more than one veterinarian, I should be almost ashamed to insert a caution, that the opening of the nasal duct may not be mistaken for a chancre. The situation of this opening is found a little way up the nostril on the reflected skin, and not on the mucous secreting surface. At an uncertain period of this form of the disease, occurring sometimes much sooner than at others, the lungs become tubercular, and hectic symptoms follow the bursting or ulceration of them: large vomicæ also form and burst; and now the health is evidently impairing fast: there is cough, loss of appetite, emaciation, and weakness in the loins; the hair feels dry, and falls off on being handled; the matter from the nose increases in quantity, becomes sanious, stinking, or bloody, and is coughed up by the mouth also; and, in the expressive words of M. Dupuy, 'the animal has a bloated aspect; the cellular tissue pits, the conjunctiva is infiltrated, the caruncula lachrymalis discoloured, the eye has the expression of a sheep suffering from the rot, the gums are pallid, and the under eyelid of the affected side juts into a prominent circle of duplication. If put to hard work, such horses rapidly decline in condition; and yet, should they be destroyed, fat is found in abundance upon the belly and about the heart.'

From the very serious effects which follow the spreading of this disease, the veterinary practitioner is often called upon to give a prompt and definitive opinion relative to it; it therefore behoves him to make himself as familiar with the criteriæ as possible. The principal intricacy that will present itself, arises from the similarity of appearance that frequently exists between the true disease and a diseased and increased muco-purulent secretion which sometimes remains after a severe cold, or is the consequence of repeated catarrhal attacks. Local inflammations also, from various causes, occasionally take place within the pituitary sinuses, which although in no degree glanderous, yet are accompanied by such a regular and continued flow of pus as to mislead the practitioner[*]. In such instances we may be led into a suspicion of the cause by the absence of visible ulceration, and probably by some tumefaction of one immediate part, and by some history of the commencement and progress of the case. In present colds the difficulty cannot be great, for the general health is commonly affected; there is some fever, loss of appetite, thirst, and cough, which are seldom seen in the early stages of glanders; and those which are more advanced require but little to distinguish them: and although in catarrh the submaxillary glands are sometimes swelled, yet they are in these cases hot also and moveable. But when colds have been severe, or often repeated, there occasionally remains in the mucous membranes of the air-passages, particularly of the Schneïderian, a disposition to a morbidly increased secretion of a muco-purulent nature, which will continue to flow from one or both nostrils. I have seen cases of this kind which have existed one and two years, and in one instance it had lasted three years, but eventually disappeared. Glanders may also be mistaken for the results of strangles: we should hope it must be slanderous, when it is asserted that the actual attack of acute strangles has been taken for glanders. The age of the horse is usually some guide; the fever, sore throat, and cough, and the size and situation of the tumefied salivary glands and the throat, will prove distinctive guides. But when the disease degenerates into the bastard strangles, or that called vives, which are only aptitudes to continued suppurations, it may be more readily mistaken; particularly as there is reason to believe this to be in some cases a true source of glanders. In both these instances our principal reliance must be on the nature of the discharge, which presents distinguishing characters, that, if attended to, will prove tolerably sure guides. It is generally tenacious and sticky, like glue; it is likewise semi-transparent, and hangs about the rim of the nostrils in a peculiar manner; but more particularly it is continually flowing: whereas in that state resulting from catarrh there is not a regular discharge, but the flow appears now and then, as when the horse coughs, or when he occasionally *clears* himself by snorting; at which times a large quantity frequently comes away, and then perhaps no more appears for some hours after. And though the matter of glanders may flow some weeks even, without apparent ulceration, yet in general cases there will occur a more early appearance of chancres, and commonly a swelling and fixture of the lymphatic gland also; to all these considerations should be added, an examination of the general health of the horse, and particularly of the state of his coat or hair, which I have always observed unthrifty and disposed to fall off in confirmed glanders. And as cases may still occur where there may be room for doubt, although certainty would be most important, we have always the means of unequivocal certainty within our reach by the sacrifice of an ass or horse of little value, which, although not a pleasant resource, is yet one which urgent circumstances might warrant. By inoculating an ass with the suspected matter, the truth will be demonstrated in a very few days, by his becoming glanderous, if the matter he received was of that nature[†]; and in these cases, as the ass is more early and more certainly susceptible of the disease than even the horse, he is the best subject for the experiment.

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[*] An apt elucidation of this may be seen in vol. ii of *The Veterinarian*, where, under the superintendence of Mr. Dick, a case apparently glanderous, having for many months a 'curdled-like matter' constantly passing from the off nostril, but without visible alteration, was deemed to be one of the same cases with those described by Mr. Dick, as being mistaken for glanders; but which is in fact only a cyst of matter formed in one or other of the sinuses of the nose. 'A perforation was made,' in the words of the account, 'at once into the nasal sinus, one inch and a half from the inner canthus of the eye, and about an inch in diameter, with a trephine.' Half a pint of thick, white, inodorous pus escaped, and continued to flow for some weeks, until a cure was established; but from the time of the operation all nasal flux ceased.

[†] The following method of ascertaining the glanderous nature of the virus has been proposed, but with very limited certainty of proof. Having turned aside the integuments over the dexter or sinister frontal sinus, as the case may be, perforate the bone with a small trephine, making the opening in the deepest part of the sinus, which will be usually found to be on an imaginary line drawn from one supra-orbital foramen to the other, at a little more than half an inch from the central septum. On warm water being thrown into this opening, a judgment is proposed to be formed by the appearance of the fluid as it escapes by the nose: if it be purulent, and particularly if it be in the slightest degree

The practitioner need hardly be cautioned on the score of the common tricks practised in horse fairs and markets to conceal the appearance of glanders. It is common with the lowest orders of these salesmen to gallop a glandered horse in some private situation, which forces him by accelerated respiration and cough to throw off the collected secretion immediately formed: some powerful astringent, as alum, vitriol, &c. is then blown up the nostrils, or in some cases the discharge is temporarily stopped by a plug or pledget of tow, cloth, &c. &c. thrust up the nose. But in all these cases the enlarged lymphatics still remain unthrifty, and the coat will in all probability come off on handling, but particularly there is a constant uneasiness in the manner of the horse, and he attempts to cough or sneeze to rid himself of the plug.

The *Treatment of Glanders.*—The philosopher's stone was scarcely sought for more earnestly by the ancients, than a *cure* for glanders by the moderns, by modern veterinarians at least. The great reward it held out has stimulated many practitioners into unnumbered experiments, and occasional success still gives a spur to the energies of new experimentalists. I was myself formerly sanguine on this head; and from considering it in the light of a specific poison, there seemed to be, as in syphilis, no reason why a specific remedy for it also might not exist: but independent of the conviction which forces itself on us that in origin, progress, and termination, it does not bear a strict analogy with any known poison, or any known disease originating in contagion, we are but too well aware, that, were we even to destroy the specific nature of the disease, there is reason to fear that the ravages already committed on the lungs would yet destroy the patient by phthisis pulmonalis. I will, however, cursorily run over the most reputed remedies which have been or continue to be tried, dwelling longest on those which offer most hope. Injections and nasal applications, on a view of its being a purely local affection, have been too long and too fully tried now to mislead; and had not a spontaneous cure every now and then occurred, and had not other nasal gleets been mistaken for glanders, they would never have been depended on for the cure of glanders: as auxiliaries they may be occasionally employed, however, with considerable advantage. Our neighbours, the French, have been equally, perhaps even more, unfortunate than ourselves in their curative attempts*. Internally, mercurials in all their forms have failed; nor have they succeeded better externally, though M. Bollestra, of Turin, professes to have witnessed benefit from ungt. hydrarg. ℥i rubbed into the inside of the thigh daily until five or six pounds have been used; but how he escaped a fatal salivation I am not aware. Huzard and Biron were employed by the French authorities to try both the muriate and carbonate of barytes, and the exhibition of both forms produced, in most instances, a remission of symptoms; but when pushed to what was deemed a necessary extent, the animals usually died from the effects of this mineral. Similar results have followed in the practice of many other veterinarians†. M. Moiroud, veterinary professor at Alfort, has given ʒij of chloride

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bloody, it is considered a presumptive proof that ulceration exists within the nasal cavities, although none could be detected by nasal inspection.

* 'Bourgelat a soumis à un examen rigoureux tous les moyens employés jusqu'à lui contre la morve; écoutons l'illustre fondateur des écoles vétérinaires. "En égard dit-il, à la morve, cette maladie formidable, aussi inconnue à tous ceux qui en dissertent, qu'à ceux que quelques lumières contiennent au moins dans les bornes d'une sage timidité, tous les efforts que l'on a faits jusqu'à présent sont demeurés inutiles. Le trépan, pratique sur differens chevaux, en appliquant deux couronnes, l'une sur le sinus frontal, l'autre à la partie inferieur du sinus maxillaire; toutes les injections détersives faits et poussées ensuite edans la vue de nettoyer les ulcères de la membrane muqueuse et d'en rétablir le ressort, des traitemens intérieurs délayans, et simplemens adoucissans; le mercure, administré par frictions, en lavemens et de toute manière: les purgatifs réitérés, l'administration de la pervenche, d'après les idées de Malouin; la liqueur distillée des bois sudorifiques, mêlée à l'antimoine et au mercure; les dépuratoires les plus actifs, la coloquinte, l'élatérium, le laurier-cerise, donnés comme altérans, quoique poussés à de très grandes doses; la poudre de ciguë enfin, rien n'a pu triompher de ce funeste virus." Dupuy also observes, "L'expérience a en outre démontré, que les sétons étaient peu efficaces dans le cas de morve, que les préparations mercurielles accéléraient la marche de cette maladie, au lieu de l'arrêter, et que les antimoniaux, comme le crocus et le kermès, qui paraissaient la ralentir, ne parvenaient point à la guérir radicalement." '

† Mr. Percivall has tried it fully; and in vol. ii of *The Veterinarian* the results of thirteen cases

of soda in a liquid form, which he has gradually increased to a very large quantity, and with very flattering appearances of amendment; but the future cases did not correspond. Camphor in daily doses of an ounce seemed to benefit a horse much; but his debility requiring the sulphate of copper in the latter stage, necessarily compounded the treatment; but he was eventually cured (see *Veterinarian*, vol. i). Mr. Coleman has given 'the various preparations of arsenic, antimony, copper, zinc, mercury, &c.; hellebore, aconitum, digitalis, hyoscyamus, cicuta, belladonna, &c. &c., *but all without any specific or curative effect*.' Mr. Sewell appears to have been more successful with the sulphate of copper (*blue vitriol*); but as the benefits received were generally confined to cases not marked with much constitutional affection, so the value of the remedy is necessarily much limited. It, however, has proved itself a valuable addition to our few curative means, a feather in the cap of this active experimentalist, and a source of deserved emolument. The mode of administration detailed below is gained from *The Veterinarian*, which purports to be the opening lecture of Mr. S. to his pupils[*]. To increase our remedial means, Mr. Vines also has lately revived the stimulating plan of treatment, and given it new publicity by his reasoning and experiments. He observes, '*The remedies which are to be employed* in those cases which are likely to run into, or are already become what is usually termed glanders or farcy, whether following colds or other diseases, or whether accompanied with dropsical enlargement of the extremities from general debility or not; or when glanders or farcy occurs in debilitated, unhealthy animals, without immediately following ordinary diseases, *are those which possess stimulating and tonic properties, separately or united*[†].' Of these a reference to Mr. Vines' work

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are detailed as follow: 1st, 7th, 8th, 11th, and 13th killed by the medicine; 3d, 5th, and 12th, destroyed unrelieved; case 2 of farcy cured; cases 4th, 6th, 9th, and 10th, glandered cases cured. Mr. P. remarks, that barytes requires great caution in its exhibition: he prefers the muriate to the nitrate, and a solution to a solid form. The solution he employs is made by dissolving one part of the salt in three of distilled water, of which he gives from two drachms to four once or twice a-day. The sum of Mr. P.'s experience is, that 'he is not sanguine of success.'

[*] Mr. Sewell observes, that many of the profession give the sulphate of copper in the solid form, but the same quantity which so given would inflame the stomach and bowels, may be exhibited innocuously in a state of solution; and which I would remark is a very judicious and valuable observation, and one which cannot be too strongly kept in mind when exhibiting the more active mineral agents, whose operations being supposed to be effected through the medium of the circulation, and the stomach being only a part of the road by which they travel there, it is of great importance that they be so sheathed as not to act injuriously on these passages, and yet to retain their ultimate activity, although thus sheathed; and which great end it may be expected is accomplished by thus exhibiting them in solution: and to further this intention, Mr. Sewell gives them in a solution of gum arabic. 'As a general dose he recommends six drachms, dissolved in a quart or three pints of fluid. He commonly suffers the animal to drink before, and some, with advantage, also allow him to drink after the medicine.' The periods of repetition of the medicine are not mentioned, but we suppose they are daily. Given in this mode, the copper is not found to nauseate the animal or take him off his appetite: in fact, the secret (if there be any) consists wholly in giving the medicine in a fluid instead of a solid form. *Veterinarian*, vol. i. It remains to add, that Mr. Sewell also applies setons in the neighbouring parts in his cure of glanders, and which it is probable may, in many cases, act beneficially, as promoting revulsion, and establishing a new and healthy suppurative action. We nevertheless cannot yet boast of possessing any certain remedy for glanders; and it remains, and probably ever will remain, the *opprobrium medicorum* of our art.

[†] After enumerating as *stimulating* articles, cantharides, canella bark, capsicum berries, cubebs, ginger, grains of paradise, all the peppers, sweet flag root, and winter's bark; and as *tonics*, angustura bark, buckbean, cascarilla bark, gentian, and quassia, which he observes will any of them increase the appetite and powers of the circulation, and improve the general health and condition, he adds, that the medicine which he has found of the greatest service, whether alone or in combination with any of these, has been cantharides: and as barytes became a subject of much experiment from its alleged power, by Dr. Crawfurd, of cure in human scrofula, so cantharides was first tried, from the remedial qualities attributed to it in the gleets from mucous membranes in syphilitic affections; and it had formerly been tried on these grounds at the Veterinary College, and since had been recommended by others, particularly by Mr. B. Clark. Cantharides Mr. Vines supposes to act on the system, by stimulating the inner coat of the stomach and intestines, and promoting a greater formation of gastric juice; and also that they appear to act by promoting absorption, as they produce, in a short time, a material change in the mucous membrane, and in the ulcers both of the nose and skin, from an unhealthy to a healthy appearance: the coat lays smoother, the swellings of the extremities, the diseased lymphatics, and their glands, gradually become less: the condition improves, and the quickness and irregularity of the pulse, so characteristic of debility, becomes fuller and stronger: and the blood, if abstracted, will be found brighter, heavier, and of a firmer consistency. The discharges, likewise, from the diseased parts, particularly from the nostrils, lose their dark colour and gluey or size-like appearance. At first the discharge is somewhat increased by the cantharides, but at the same time it is more healthy, and the increase itself is indicative of the commencement of a healthy suppurative process. Setons and rowels, as counter-irritants, Mr. V. objects to, on a supposition that they only add to the general exhaustion of the system, which he seems to think to be in every case the grand agent in the disease. Mr. Vines states, that many practitioners, at his suggestion, now give cantharides with no inconsiderable success; and that of all the medicines given for the cure of glanders

will shew that he places his principal dependence on cantharides; which have long been before the public as remedies for nasal gleets, but have never received such ample elucidation as by his means. These he gives every or every other day, in the form of a ball, either morning or evening, (he, however, prefers the evening) with ginger, gentian, and caraway seeds. He commences with four or five grains of the cantharides, according to size, age, condition, &c. in fine powder, which, if well borne, is, after ten days or a fortnight, increased to six or eight grains, according to the circumstances alluded to. When this increased dose has been in use a few days, desist altogether from the medicine for four or five days, and then recommence it again, but with the smaller dose. As I have had, of late years, some experience of the good effect of cantharides in mild cases of chronic glanders and farcy, and from thence consider them worthy the trial of veterinarians, so I have preferred noticing them in this way, involving as it does both precept and experience from such an accredited source: adding my full conviction, that the remedy will receive no improper check in any quarter of that establishment from whence it emanates. If it can be safely and effectively administered, it is there it must pass its probation: it is not less the inclination than the duty and interest of all the distinguished teachers at that valuable institution, the Veterinary College, to foster and promulgate every means likely to stop the ravages of this malady.

Mr. Bracy Clark's formula of administration of cantharides, in conjunction with mineral tonics to be given daily, is as follows:—

Sulphate of zinc (*white vitriol*).........	fifteen grains
Powdered cantharides	seven grains
Powdered allspice....................................	fifteen grains.

Since the last edition I have reason to know, that beyond the two remarkable instances noted in Mr. Clark's practice, two others have been handed to me, where this form of administration was gained from the VETERINARY OUTLINES. Therefore, with the cautions detailed in the note, of beginning with a minor dose, I would recommend that the cantharides be coupled either with the sulphate of copper or sulphate of zinc (*blue* or *white vitriol*), and with or without any spicy or bitter tonic, as may please the fancy of the exhibitor. We cannot conclude without recommending the reader to turn to the encouraging account of the effects of barytes in glanders, administered by Mr. W. Percivall. See *Veterinarian*, vol. ii, p. 178.

Disinfecting properties of chloride of soda where the contagion of glanders may be supposed to lurk.—It is consolatory to be aware that such a preventive appears from the account of General Lord Talon, who experimented on the communicability of the disease through the contact of various infected media. See *Veterinarian*, vol. ii, p. 385.

Glanders communicable to the human subject also.—A reference to *The Veterinarian*, vol. xiii, p. 445, will shew the necessity there is that the human attendant on glandered horses should be very careful to avoid any contact with *the matter of glanders*, and particularly with the nasal discharge; which if by any means it should reach the surface of any of the mucous membranes, will in all probability fatally inoculate the individual having so received it. Dr. Barham, of Truro, in vol. xiii of *The Veterinarian*, p. 445, relates the melancholy death of

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and farcy, none have ever equalled cantharides, or produced any thing like such rapid and decided effects and permanent benefits. Under these reports, made from such a source, it becomes a duty with the veterinarian to give these active agents a fair trial; but let him be aware that he must do it with the utmost caution, as Mr. V. himself candidly acknowledges they are capable of producing very untoward symptoms. I can add also, that they have destroyed the horses on which they have been tried in a very rapid and unexpected manner. By Mr. Vines's own account they can produce great disturbance in the system, with all the marks of high vascular excitement, quickened respiration, inflamed pituitary and conjunctive membranes, greatly increased discharges, and more extended tumefaction of the already swollen limbs, and sometimes costiveness. These effects, he remarks, are the consequence of an over-dose, or of using them in the early or inflammatory stages of the disease. Consequently we should suppose Mr. V. thinks them less applicable to the acute than to the chronic form of glanders. He adds, in confirmation of this view, that when the symptoms of the disease are of a chronic or slow form, and when the system is in a state of direct debility, and when there are nasal discharges, which, without direct glanderous characters, are suspicious, or border on or lead to the direct complaint, then they can be used with eminent advantage.

a young man, who, anxious to conceal the state of his horse, used to wipe the glanderous discharge from its nose with his pocket handkerchief; and in consequence died a terrible martyr to his fraudulent proceeding by using the same handkerchief to wipe his own nose and face.

FARCY.

FROM what has preceded on the subject of glanders, it will appear that these two diseases are fully proved to be modifications only of each other. Though the older writers were aware that one sometimes terminated in the other, yet they still considered them as two distinct affections; and this the more, as farcy was found to be often curable, but glanders very seldom. Farcy was long considered to be a disease of the veins, which error was natural enough, seeing the lymphatic vessels, in which course the virus travels, were then considered as a species of veins. We are now, however, aware that this disease, in its local or early state, is a *specific inflammation of the absorbents of the skin:* experience has also taught us, that as long as its attack remains thus superficially confined, it is not difficult, in many cases, to cure; but that when it has entered the constitution by absorption, or when it originates within, it generally proves fatal, and almost invariably so when it ends, as it usually does, in glanders: in return, acute glanders is very apt to end, indeed almost invariably, in farcy. Farcy is, however, not confined to the superficial parts of the body alone, for it may be occasionally met with much deeper seated, and in every part of the body; but the head, neck, and extremities, particularly the hinder ones, are the parts most generally affected; by which it would seem to choose those situations most distant from the seat of circulation, but most exposed to the influence of absorption: it therefore travels within the course of the larger lymphatic trunks, within the thighs and arms, and also over the lips, face, and neck. When farcied virus is absorbed by the lymphatic pores, it sometimes occasions inflammation in the immediate lymphatic vessel, which it first tumefies and then ulcerates. In other instances, its progress seems to be arrested by a valve, which itself becomes inflamed, hardened, and then forms the lump which is popularly called a *farcy bud.* The slow progress of the disease, in many cases, seems to be dependent on this obstruction offered to the passage of the poison by means of the swellings of the lymphatic glands; and it is probably by arresting the poison at these halting places that we are enabled in the early stages more readily to promote the cure. At length, however, if nothing be done, these indolent tumours increase, become hot and tender, and then ulcerate, and discharge a thin sanies; and from one bud it passes on to another, inflaming the lymphatic vessels in its progress, and giving them a hardened feel like a cord under the skin; and as these vessels run in the course of the veins, so the older farriers were from thence led to their opinion that the farcy was a venous disease, and we find in their writings these enlargements are always described as the '*corded veins.*' The invariable course of the affection is towards the thoracic duct, as might be expected, seeing it is, during the early stages, confined to the absorbents, in its passage towards which it inflames and enlarges all the superficial lymphatic glands it meets with: from whençe follow not only numerous little farcy buds in the skin, but larger and painful swellings take place in the more considerable absorbent glands of the groin, and of those between the fore legs and maxillæ. Sometimes the larger lymphatic trunks proceed to suppurate, when they form extensive sinuses, the farriers' '*farcy pipes,*' which are found, like most poisoned wounds, very difficult of cure.

Farcy is subject to varieties in form and character. It has assumed an epidemic feature, and it often appears compounded with, and modified by, other complaints; but by no means so frequently as the ignorance of farriers would make it, who call every diffused swelling, from whatever cause, 'farcied humours.' Two distinct varieties of farcy are very common; one of which is entirely superficial, and confined to the lymphatics of the skin, and is often called by farriers the *button* farcy. The other commences usually in the extremities, and generally the hinder ones: the capillary lymphatic tubes throughout become inflamed and incapable of their usual office, and hence engorgement of the whole limb takes place, not uniformly, but still universally. This farcied enlargement of a limb is not, to a partial observer, unlike the ligamentary thickening of a gorged leg, neither is it much unlike the swelling from œdema or effusion. But these swellings, when they arise from farcy, will present an uneven surface; increasing and decreasing suddenly, and are further characterised by much pain and exquisite tenderness. The lymphatic glands of the skin will here and there point themselves into small buds; and it is further worthy of remark, that such swellings are more likely to exist in definite masses, and *between* the joints than *on* them or *near* them; which is not the case in ligamentary enlargements arising from over-exertion or strain, with which these cases are apt to be confounded, as the more superficial kind is liable sometimes to be taken for those integumental small tumours called surfeit; but which are broader, flatter, and generally more diffused over the trunk than the extremities; and when found on the extremities, they are usually situated on the outer side, whereas the farcied buds are more frequently on the inner side of the limb. In some cases, however, œdema or actual dropsy of the limb does occur, dependent on the obstruction offered to the passing of the absorbed lymph: a horse thus affected is often said to have *water farcy*, which see: in such a case as this, exercise, by stimulating the anastomosing trunks, will take it away, and this sometimes misleads the observer into a supposition that the case is dependent on a general debility, or want of condition; or arises from cracks, grease, &c. But in these instances it may be observed, that it is only a portion of the swelling; that is, it is simply the œdema which is removed; the farcied enlargements will remain the same. The infected lymphatic glands or *buds* will sometimes also, instead of suppurating, take on a scirrhous induration, and remain thus hardened for a long time; but eventually it happens that they either, by absorption, produce tubercles and pulmonary vomicæ, or are translated to the nose, or end in a diseased thickening of large masses of the skin, neck, withers, and croup. A variety of farcy remains to be noticed, which is usually passed over by authors, and which is also one wherein the poison is self-generated, probably. It often puts on a chronic protracted form, and shews itself by the affected horse becoming suddenly lame in one limb, the tumefaction and heat of which recede and attack the other limb in the same manner. In this way he may remain for months, with his health very slightly affected; at length, however, the disease assumes a more marked character, some of the swellings ulcerate, and glanders eventually closes the scene. Old horses are more frequently the subject of farcy than younger ones, which does not appear to be the case with spontaneous glanders.

The *causes* of farcy, with the exception of contagion, are of the same complexion with those of glanders, but are more varied, and numerous also. Infection, in the strict sense of the word, is seldom, perhaps never, the source of farcy. It is necessary, for the production of farcy, that there be an actual application of the matter at least to a bare surface; probably also it requires either a mucous or an abraded surface*. I am not aware that the introduction of the matter of farcy into the stomach will occasion it. I imagine not. Long continued grease will sometimes degenerate into it, thus shewing us that the morbid poison is dependent on some peculiar combinations. Long continued canker will do the same: in fact, whatever debilitates and extensively ulcerates the extremities may occasion it, particularly when combined with neglect in cleanliness and by living in contaminated air, which is supposed, though not equally so, yet to be of itself capable of producing farcy, as it produces glanders.

The *Treatment of Farcy.*—In the very early stages of this complaint, when it has been taken by inoculation, or has originated in diseased extremities, and, indeed, in all such cases in which it is confined to the lymphatics of the skin, it is not always found difficult of cure; but when it has been spontaneously generated in the habit from any of the constitutional causes of glanders, it partakes of the virulence and obstinacy of the affection generally. It is also almost equally difficult of cure when it enters by means of the mucous membranes of the head, for in these cases the stage between farcy and glanders is so short as to admit of little curative attempt. There is, however, a pause in some cases between the taking on of the full character of glanders, during which pause a treatment of it judiciously exerted sometimes proves beneficial: but having once assumed the full glanderous characters, the case becomes nearly hopeless. Nevertheless, I am not prepared to say that it is never cured when it has even tainted the constitution in this way: on the contrary, I think there is reason to suppose that it is sometimes eradicated after this; but when it has propagated its morbid effects to the lungs, whatever may become of the farcy, the horse invariably dies tabid. Unless it be accompanied with confirmed glanders, many practitioners consider every case of farcy as purely a local affection, and their treatment has been accordant with that idea, but I now think it most unsafe to trust to such a consideration of it. I formerly was inclined to hope that it might be effectually arrested in the first instance in the absorbents, by topical means, and that nothing more than the destruction of these was necessary to effect all we wish; nor can it be denied that, sometimes, this has succeeded; but, unfortunately, it is difficult to do this: the virus has either already been absorbed, or we have not destroyed all the poisoned parts, and therefore it is very usual in these cases for the disease after some time to reappear, and commonly in a more malignant form. I would therefore recommend to the practitioner always to *treat* it as a constitutional affection. In the acute form of farcy attend first to symptoms and obviate their effects; which done, proceed to attack the farcied virus. Do the same by that tumefied state into which the limbs sometimes fall. In the true chronic form of the disease, where the superficial lymphatic vessels and glands are the seat of the affection, the cure should be commenced by destroying all the diseased *buds* by caustic or by cautery, and this whether they are ulcerated or not. The quickest mode is to divide them with a sharp firing-iron, particularly such as are directly superficial: if deeper seated, an opening may be made into each with a lancet, and the bud touched effectually with the lapis infernalis (See *Caustics*, *Materia Medica)*. In more advanced stages, when these tumours are extensive, and have burst, wash with sea water, or with a strong solution of common salt, or one may be made of nitric acid diluted with water, to a state that does not give inconvenient pain, and with either of these the sores may be washed twice or three times a-day. The internal remedies used are various. Nearly all the mineral acids have been found useful and some of the vegetable ones: it indeed seems principally necessary to the destruction of the farcied virus, that some other poison of greater activity should be admitted into the constitution though with its acrimony sheathed in some degree; and in such way only can we account for so many of the active agents in the materia medica being found useful in farcy. All the different forms of mercury have been tried with some success: but the oxymuriate of quicksilver *(corrosive sublimate)* appears to have answered best; and, when determined on, should be given to the full extent the stomach and bowels will bear, without salivation, purging, or symptoms of inflammation being brought on. Ten or fifteen grains may be commenced with, ground very finely, and given night and morning in gruel as a drench, or mixed with butter, lard, or any other substance, as a ball. If this occasion no distress, it may be increased to a scruple, and from this to half a drachm, if it be borne with ease; but the utmost care and watchfulness should be exerted when the dose is considerable; for it must be remembered that, with all the mineral acids, they will often exert no deleterious effect until the constitution is supersaturated with them, when they suddenly exert their potency in united baneful effects. When the weakness and irritability of the horse are too great for the exhibition of the corrosive sublimate, give half a drachm of calomel twice a-day, or the blue pill, or the sulphuret of mercury may be substituted, still carefully watching the salivating process. Should the stomach suffer much under the use of these active agents, either join with them bitter tonics, or alternate them with each other. We would also recommend that they be in these cases given in solution, and further sheathed by one of a mucilaginous nature. See the account of Mr. Sewell's plan of procedure already detailed in note, p. 349. Mr. Peal recommends the sulphate of mercury, in daily doses of half a drachm, united with a drachm of gum guaiacum.

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* Mr. Peal smeared the mucous membrane of the nose of an ass with farcied virus, and in eight days it was highly glandered.

After the trial of mercurials, arsenic ought next to claim the attention, as that has also proved efficacious, and may be given in similar quantities, in the same forms and with equal caution. The subacetate of copper *(verdigris)* was for some time a favourite remedy at the Veterinary College, in doses of a scruple three times a-day, increased to a drachm. I have witnessed also good effects from this preparation: but I have found it most efficacious when given in a ball in conjunction with the sulphate of copper *(blue vitriol)*, one drachm at a dose. Mr. Coleman, I believe, principally depended on the sulphate or the acetate of copper, combined with some terebinthinate, and commenced, whichever was preferred, by doses of ʒii to ℥i every day or every other day, as the stomach would bear it. Some practitioners choose to employ several articles in conjunction, and they assert the cure is speedier from the combination than from any one article separately. In this case, give the following:—

Oxymuriate of quicksilver *(corrosive sublimate)*.........	eight grains
Oxide of arsenic *(arsenic)*....................................	ditto
Subacetate of copper *(verdigris)*..........................	ditto
Sulphate of copper *(blue vitriol)*..........................	one scruple.

Mix into a ball, and give every morning.

Should the subject be small or weakly, begin with a smaller dose of each of the articles: but in any case, when the quantity is found to sit well on the stomach increase the dose of each article, daily, one or two grains, carefully watching the effects produced, occasionally resting a day or two: and however well the ball may seem to agree, do not increase the more active mineral agents beyond fifteen or twenty grains each, without great caution, and the most marked attention to the effects. It has been thought prudent by some to divide the dose, and to give the half, night and morning; but I have not, in general, found any benefit from this plan, for the quantity that the stomach and constitution will bear, will be as well borne at once as at twice; and it may be also remarked, that some horses can take three or four times more than others; and therefore, although great caution be necessary in proceeding with the use of the mineral agents, it is equally necessary that the dose should be increased, in all cases, to as much as the constitution will bear (See *Mercurials and Arsenic in the Materia Medica)*. During their exhibition it is also absolutely necessary that the patient should be supported liberally; nor should the stomach and bowels ever be suffered to remain empty for any great length of time.

In addition also to the use of the mineral acids, I have experienced much benefit from the following drink given in conjunction with the ball beforementioned every day, but not at the same time of the day; the ball in the morning, for instance, and the drink in the evening:—

The expressed juice of the clivers, or goose grass...	six ounces
A very strong decoction of hempseeds......	ditto
Essence of spruce..	ditto

Mix.

Green meat should be particularly sought after, and if the bowels will bear it, the horse should be wholly fed on it; but if it gripe, add opium or hyoscyamus to the medicinal agents, and to the food a quantity of bean meal or split beans. Moist and succulent food appears to do much towards a cure: in one instance, a horse so reduced as not to be able to stand, was drawn into a field of tares and suffered to take his chance; the consequence was, that when he had eaten all within his reach, he was able to rise and search for more, and eventually recovered. When, therefore, green meat cannot be got, feed on carrots, mangel wurzel, potatoes boiled, turnips or parsneps: and in the event of none of these being to be obtained, spear the corn, or give malt. It remains to add, that I have received benefit in two or three instances, from the use of molasses to the amount of four pounds per day; but it has in other instances altogether failed. Sea bathing, with daily doses of sea water, I have also experienced beneficial effects from in the long protracted cases of farcy, with enlarged limbs and œdema; and the application of the sea water as an embrocation, several times a-day, has been attended with singular good effect in the practice of many veterinarians, both at home and abroad.

DYSENTERY.

Dysenteria, the *grasfondu* of the French, and the *molten grease* of our farriers, is, in itself, one of the strongest proofs of the pitiable state in which veterinary medicine was so longed plunged. Bartlett says, 'by molten grease is meant a fatty or oily discharge with the dung, and arises from a colliquation, or melting down of the fat of a horse's body by violent exercise in very hot weather.' Bracken and Gibson had held the same before him, and even later writers have so described it. Dysentery in the horse is not recognised by some nosologists, both among the French and English: and viewed principally as contagious pyrexia it probably does not deserve the title, for we do not see it in that form; but if a catarrhal inflammation of the mucous surfaces of the intestines, which under certain circumstances, seasons, and situations assumes epidemial and also endemial characters, can lay claim to the appellation, then has the horse dysentery. Others consider it in the light of a diarrhœa; but in my own opinion its characters are distinct from a simple increase of the peristaltic motion[*]. Under my view of it, it consists in an inflammation, somewhat of a peculiar nature, of the mucous linings of the intestines, attended with an increased quantity of their natural mucous secretions; and as the disease advances, of a morbid alteration of that secretion, and a frequent discharge of it; which from its glairy consistence has been mistaken for the fat of the body melted by heat or exercise, hence the term *molten grease*; and being accompanied with fever or general inflammatory action, as the blood when drawn exhibited much buff or coagulable lymph, this also was mistaken for adeps, and was regarded as a further proof, that the fat of the body was at these times in a state of general solution, and floating loose throughout.

The *symptoms* that characterise dysentery as a *primary* affection, are the frequent voiding of fæcal discharges in stringy portions, not unlike slimy or loose fat, and fœtid, with considerable uneasiness from the tenesmus, and constant inclination to stool. The mucus is mixed in general with the fæces, which are not retained, as in human dysentery. If the disease increase in violence, membranous films of coagulable lymph, like sodden leather, are thrown out; and in very aggravated cases, the vessels eject blood instead of lymph; and now and then the intestines become ulcerated. The pulse is variously affected: as, when the inflammation is not intense, it is quickened, corded, and hard, but not wiry, as in peritoneal inflammation; but when the case is very intense, or it is about to degenerate into peritoneal inflammation, as it sometimes does, the pulse does become wiry and oppressed. The mouth is always dry, the appetite lost, the flanks heave, and there is usually much thirst: the legs and ears are warm.

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[*] Mr. Percivall treats of dysentery under the head diarrhœa; yet it is evident that the difference had not escaped his acuteness. He says both horses and cattle are, he believes, more liable to dysentery than diarrhœa; but the variety called molten grease he thinks rare, although he does not deny its existence. Mr. Peall also unites the descriptions of dysentery and diarrhœa. Hurtrel d'Arboval has—'*Dysentérie*. Ce que nous avons dit de la diarrhées s'applique des formes de l'entérite;' but from the following, under the head entérite diarrhéique, we detect dysenteric characters: 'C'est ce que l'on appelle encore diarrhée, foire, flux, catarrh intestinal, cours de ventre. Lorsqu'on s'est attaché au seul aspect des matières on a admis une diarrhée stercorale, muqueuse, séreuse *sanguinolente*, vermineuse, lientérique, cœliaque, *laiteuse* ou *chyleuse*, purulente, et même *graisseuse*.' Mons. Huzard, jun. says of dysentery, 'Quelquefois aussi elle n'est que le symptome d'autres maladies plus graves, de fièvres de mauvais charactère, par example; son traitement est alors subordonné à celui de la maladie principale.' 'Quelquefois la dysenterie attaque une grande quantité d'animaux à la fois, soits chevaux, soit bêtes à cornes; elle est enzootique, et reconnait pour cause les intempéries des saisons ou la mauvaise qualité des fourrages, des herbages ou des eaux.'—(*Esquisse de Nosograph. Vet. p.* 168.)

Causes.—It is usually dependent on an inflammatory habit, acted upon by some immediate excitement; and, as such, it is more often observed in the young and robust, from a sudden check to the perspiration, a change of food, cold, fatigue, &c.: acrid substances, as mineral poisons, may occasion it; and, not unfrequently it is the effect of drastic and improper purgatives, in which cases it commences in diarrhœa. One other cause also remains to be noticed, but which is seldom taken into the account, and that is *metastasis*, or the translation of the matter of fever to the intestines; and which is, I am disposed to believe, a more frequent one than is generally imagined. It has been brought on by eating of improper herbage; and also appears now and then the produce of some low marshy situations, particularly in cold rainy seasons; in which cases it partakes of an adynamic type.

Treatment.—If the inflammatory symptoms run high, bleed; and as long as the pulse indicates strong inflammatory action, repeat venesection in moderate quantities, well watching the pulse, and as soon as it becomes softer, although it may also become fuller, relax the depletion. If the evacuations present scybala, or hard impacted masses of dung, do not hesitate to give a solution of sulphate of magnesia, in sufficient quantity to relax the bowels into a true fæcal discharge. Much more frequently there will be liquid or mixed evacuations of the fæces and the intestinal mucus together. It will, in such cases, be the practitioner's duty to form a true distinction between inordinate diarrhœa and dysentery; and it is from the mucous quality of the stools mixed with membranous masses that he must assure himself of the true dysenteric character: in which case, notwithstanding the odium which castor oil has lately obtained, it will here prove his sheet anchor, with the following accompaniments:—

Castor oil	eight ounces
Powdered ipecacuanha..............................	one drachm
Powdered opium	one scruple
Liquid arrow-root	eight ounces.

Mix, and repeat once or twice, at intervals of six hours: after which, should the discharge continue unchecked, for the castor oil substitute thick boiled starch, and with the other articles, till the discharges have returned to their usual state. In two dysenteric cases I gave calomel and opium liberally, and with great benefit; but as I lost the next horse I tried it on, I at that time discontinued the practice: I have, however, since recommended it, and with somewhat variable success. If green meat can be procured, it should be tried, but with some caution. I have known it prove the best remedy; and I have observed the same of carrots in winter: but I have also known succulent food do harm; in which cases substitute malt mashes. When the inflammatory symptoms run very high, the belly may be properly fomented with a hot decoction of poppy heads, and a new sheep skin, if at hand, may be applied afterwards. Or the mustard poultice (see *Mat. Med.*) is by no means an improper application when the inflammation of the bowels appears considerable. Warm clothing is proper, and a moderate temperature; and when convalescence approaches, every care must be taken to prevent a return of the complaint.

DYSENTERY IN CATTLE.

In oxen and cows this is called *scouring*, *scouring cow*, *brazy*, *bloody ray*, and *slimy flux*. Some of these names, particularly the three latter, are peculiar to this complaint; the two former are common to this and to diarrhœa, or common looseness, with which this is very liable to be confounded; and few of the practitioners among cattle are aware of the real distinctions between the two, and hence the same treatment is pursued for the one as the other. The dysentery is characterised by a peculiar discharge from the bowels of a frothy slimy nature, with much fœtor or bad smell: sometimes it looks red or brown, and sometimes more yellow, with mucous stringy patches in it; and if observed when voided, it is very hot, and smokes. These appearances of the matter discharged should be particularly attended to, as they will serve readily to characterise the disease, and to distinguish it from simple diarrhœa, in which there is nothing more than a liquid discharge of dung, composed of the mere matters taken in by the stomach in a state of solution. Fortunately dysentery is not a very frequent visitor among cattle; nevertheless, enough of it has been seen to render us wishful to check it as early as possible. The extreme cases were fatal almost without an exception, but such as were slighter gave way to judicious treatment; and it was observed that aperients administered to the unattacked, in most cases secured them from it, which tended to throw much light on the disease as resulting from morbid ingesta. 'The disease,' we are told by Mr. T. Mayer, jun., V.S., of Newcastle-under-Line, 'was ushered in by a dull anxious appearance, the eyelids and dewlap were of a yellow tinge, and in dairy cows there was a total suspension of the secretion of milk; a slight muco-purulent discharge from the nostrils was also observed; the appetite was indifferent, bowels costive, the dung of a dark colour, having portions of blood diffused through it; but the urine was not much affected. The pulse for the first twenty-four or forty hours, when the disease came on more gradually, was not much affected; but afterwards it became frequent, small, and hard, beating at the rate of seventy or eighty pulsations per minute. In extreme cases the febrile action set in from the first, accompanied with violent diarrhœa and tenesmus; the fæcal discharge being intolerably offensive, and consisting of a thin, watery, dirty, green-coloured fluid, full of shreds of coagulable lymph, mucus, and grumous blood. In some, it consisted of a blackish green mucous discharge; in others, it was principally mucus, coagulable, lymph, and blood, with, comparatively speaking, no portion of fæces along with it. The extremities were alternately hot and cold; the surface of the nose sometimes dry, at others having a dew upon it; occasionally during the cold fit the eyes would become sunk in their orbits, the features collapsed, the nose, inner part of the lips, and tongue were of a deadly pallidness, which would be followed up by reaction, and a consequent hot fit again. The bowels were affected, in some of the extreme cases, with colicky pains; and in every case there was obstinate constipation and obstruction in the second and third stomachs. If relief was not afforded, the disease terminated fatally on the third or fourth day.' *Veterinarian*, vol. v, p. 185.

DYSENTERY IN SHEEP.

Sheep are also troubled with a dysenteric affection called *braxy*, in which there is a frequent stooling of soft dung mixed with blood and mucus. When it terminates fatally, these motions become dark and fœtid. If the inner surface of the eye be very red, and the animal strong, take eight ounces of blood away. Give two or three ounces of castor oil, with thirty drops of laudanum; or an ounce of salts, with the same quantity of opiate: after which give, night and morning, the following:—

Powdered ipecacuanha	fifteen grains
Prepared chalk	one drachm
Powdered opium	two grains
Boiled starch	four ounces.

House the animal, give gruel or starch in case the cud is lost, and a cure may be completed.

ROT IN SHEEP.

Rot in sheep is a disease that the public in general, the agriculturalist in particular, and the veterinary students one and all are deeply interested in. Indeed, if Dr. Edward Harrison is right in his assertions—and there is every reason for considering that he is so—then it is not sheep alone that suffer by this pest, but that cows, horses, asses, hogs, deer, hares and rabbits are also affected by it. Nor does it even stop here, but, according to the learned doctor, its ravages extend to geese, pigeons, turkeys, and other poultry. Whether this be actually the case or not, it does appear that poor clayey and moist lands are most liable to beget the rot in most of the animals that pasture on them; for on such lands the water which falls not being able to soak through, nor yet evaporate therefrom, it remains stagnant, and begets miasm as it exhales, and likewise generates, as some suppose, the germs of insects, as flukes, fasciolæ hepaticæ, &c. &c. which are received by grazing animals with the food. As most sheep affected with *rot* present flukes, it is not an unnatural conclusion that they have much to do with the diseased symptoms, and the fatal issue which succeeds them. It is certainly true what Dr. Harrison observes, 'that although there is much difficulty in coming to a conclusion, the rot is, without doubt, the consequence of receiving certain insects into the body. For why,' he says, 'does it happen that sometimes the liver is injured in its texture, and at other times is not disturbed in its functions, by these insects? The hay of moist lands, be it also observed, under certain circumstances gives a more virulent and dangerous rot than any other. The contagions of the plague, and of several infective disorders, it is well known, are preserved for a long time in bales of cotton and wearing apparel, from which they are emitted with increased virulence. We are, therefore, led by analogy to conclude, that the miasmata are preserved in the hay, which acts as a nidus to them, like cotton, &c. to human effluvia. On this principle the fact admits of a ready solution; though, on any other, we should have great difficulty in explaining it. To me it seems a very improbable supposition, that any being is able to live equally in moist grounds, in hay, and in the viscera of animals. The range of life will not, I conceive, admit of such a diversified existence.' *Farrier and Naturalist*, No. 7. Nevertheless, we are constrained to allow, that human worms, as tinea, ascaris, and lumbrici, are well known residents within our bodies, nor are we in a state to deny that the others we have pointed out are not uncommon in sheep. It appears that this verminous disease, as some call it, is known throughout every part of the world where this valuable animal is cultivated. In Egypt it is very common, and is not there confined to sheep, but it also attacks horses, bovine kine, and most of the lesser animals as well, and is very fatal to them; particularly it is so on the whole of the borderings of the Nile, the immense overflowings of which spread a frightful mortality among the numerous grazing tribes which browse on the plants affected by this overflow. The Arabs are reported to affirm, that this pest annually destroys not less than sixteen thousand sheep. The acumen of these shepherds must be very great indeed, for we are told that the Arab shepherd readily distinguishes the sheep affected by rot from others, by the presence of a bagful of water found under the tongue. As the disease progresses, the affected animals become debile in the extreme, and are mostly found lying down; their wool falls off, and a sanious matter of varied colours issues from the nose. When dead, the body is found œdematous throughout, and the liver is usually filled with hydatids, and a cough, accompanied with diarrhœa, are premonitory symptoms of an early death.

All recognise one common cause of this disease, which is low marshy pasturage presenting certain plants, but which have not hitherto been definitely pointed out. Indeed, although in every country it is agreed that the eating of vegetable matter growing in low marshy situations, particularly in such as are only occasionally flooded, is an active agent in producing the rot, yet but few hints of any certain curative practice has reached us. Prevention is, however, in our power, by a removal of the animals from the localities specified to others which are dry. A farm well sheltered is an excellent situation, and dry food their best sustenance. Hay is good, and when it is alternated with a few carrots, turnips, parsneps, such food often proves restorative. Should the owner reside within a reasonable distance of salt marshes, let him by all means remove his flock there. Common salt has also been given as a remedy, and as it is stated has been found serviceable. Some French veterinarians have recommended that the infected animals should be allowed to drink twice a day water of the temperature which it usually is at the well, whatever may be the kind of food, but never to allow them to drink to satiety; and that iron filings should be put in the same water in the proportion of a pound to a gallon. The iron should be left exposed to the air when the buckets are empty, which should be filled again in an hour before the watering time arrives. On every third day there should be given, morning and night, about ten pounds of dry bran, mixed with half a pound of culinary salt; to which should be added, six ounces of aromatic plants cut small, as thyme, sage, juniper, rosemary, lavender, bay or orange leaves; to which must be added five ounces of the green anise, and of fennel, and of coriander. This will be sufficient for thirty sheep. We are indebted to that most excellent periodical, *The Veterinarian*, for much of this account. Some of it also we have gained from the ingenious researches and communications of Dr. Harrison, as they appear in the *Farrier and Naturalist*, a periodical of ephemeral duration, but not wanting in merit or interest, the latter being kept up by the multifarious articles of which it was composed.

CLASS IV.

DISEASES OF THE BRAIN AND NERVES.

I SHALL commence a consideration of the individual diseases of this class by some general observations on the origin of affections of the nervous system generally, which is the more necessary, as we here, in some measure, lose our reference to human pathology, which, whatever may be said to the contrary, has been the groundwork of all our veterinary attainments. A more extended acquaintance with comparative anatomy; the symptomatology of the nervous diseases of brutes; and the post-mortem appearances which accompany their results, teach us to attribute to derangements of the spinal cord some of those affections which human pathology has ascribed, and with justice ascribed, to morbid states of the cerebral mass; for as in man the cerebral has a paramount ascendency over the nervous masses, the cerebral influence may be supposed to prevail in ourselves. But in the horse, where the organs of sense are the grand media of discrimination, the nervous mass is greatly superior to the cerebral; and we do find, in accordance with this, that affections of the spinal cord, and their results, are more numerous. (See *Neurology*, p. 162.) An apoplectic termination of human life is by no means uncommon; in the horse it is little known; but the frequency with which spinal affections occur, bear little proportion between the two; and, taking all the circumstances into consideration, are more than equal to the nervous affections of mankind. Girard, Dupuy, and other French veterinarians, have especially directed our attention to the diseases of the spinal canal; and our own observations united with theirs have awakened us to a consideration, that although many morbid phenomena are yet attibutable to cerebral affection, yet many others, whose origin remained obscure, are dependent on affections of the spinal marrow. Dissections of morbid subjects have also shewn, that the causes of these are various, but are usually referrible either to pressure on the spinal cord, or otherwise to a morbid alteration of structure in the cord itself, or in its membranes.

Pressure on the medulla spinalis may be the consequence of either traumatic or of spontaneous lesion; or it may originate in the introduction of foreign substances, as hydatids, &c. *Traumatic lesions* are very common from fractures of some of the vertebra, or from luxations: an aneurism of the aorta has occasioned it; exostosis and poll-evil have also done the same; the one by an osseous deposit within the canal, and the other by ulceration through the articular membranes, and an effusion of pus within the same. *Spontaneous lesion* produces either sanguineous congestion, or otherwise it is accompanied with an increased effusion of interstitial fluid within the spinal sheath*. It is said that the sanguineous congestion of the membranes often precedes inflammation of the spinal cord itself, in which cases a rapid paralysis follows. We are also led to believe, that the membranes of the cord can inflame independently, and the same with the spinal rope, productive of a series of symptoms of greater or less intensity, as the inflammation is nearer or further from the brain. The state of the spinal cord, called myelitis, is always productive of paralysis, and the parts paralysed, with the degree and nature of the affection, are all regulated by the immediate portion of spinal rope affected; it being found to be sometimes confined to the upper, and sometimes to the under part of it. When the substance both *superiorly* and *inferiorly* is inflamed, then it is usually found that both *sensation* and *voluntary motion* are destroyed; but when the inflammation is limited to the *superior* portion, the *sensation* is principally impaired; and when, on the contrary, the *inferior* half of the cord is affected, then *motion* is destroyed. A *morbid alteration* in structure also takes place in the spinal rope, and is sometimes consequent to inflammation: and it may have other causes also. It has been found in most of our domestic animals, and in diseases which do not enter this class, as in rabies in dogs, stomach staggers in horses, &c. The spinal cord in these cases becomes soft, and converted into a greyish pulpy mass, losing its original fibrous structure, where paralysis has always been present. But we must not be misled by this *exposé* to attribute all the affections of this class to the spinal brain: we owe many of the most important of them to morbid states of the cranial brain, as apoplexy, and most cases of *complete* paralysis. Convulsive and tetanic cases are some of them immediately derived from irritation on the fountain of nervous energy. Neither must we lose sight of the retrograde march of some nervous irritations, which are derived neither from the cranial or spinal brain; but originate in the extremities of the nerves, and are transmitted to one or other, or to both these sources, which then become secondarily and not primarily affected, as in the case of traumatic tetanus, &c. &c.[*] These considerations we recommend to the student; at the same time we inform him, that he will find the subject more at large in *The Veterinarian*, vol. iii, particularly when a promise which followed the last detail *(that the subject was to be continued)* is fulfilled. A concise but forcible summary of these diseases is also thus expressed in the *Farmer's Series of Useful Knowledge*[†].

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* I shall not attempt the discrimination of the locality of the effusion: it is said to be, in general, between the pia mater and arachnoides: occasionally, we are informed by M. Bouley, it exists in the tissue which unites the dura mater to the vertebræ, and but rarely within the spinal sheath.

PHRENITIS, OR INFLAMMATION OF THE BRAIN.—(See CLASS II.)

APOPLEXY

Apoplexia does not very often occur in the horse; but as it does take place, although usually irremediable, it merits a place in our nosology. It appears to consist in a lesion of some of the vessels of the brain, which, by pouring out their contents, produce pressure and irritation. Foreign veterinarians have divided it, after the human, into sanguineous and serous; but as far as I have learned, it is the former which has been principally met with among us. The usual *causes* are such as, were it not for the length of the neck, must operate more frequently than they do: these are cerebral congestions, commencing in the chest from inordinate exertions; occasionally but less frequently it may have other sources. The *symptoms* are, head depressed, sleepy state, almost insensible, dilated pupils, and an abundant salivation. The breathing is laborious, pulse oppressed and indistinct, and the extremities cold. In the more active states of suffusion, the animal is found prostrate, and wholly insensible, with some partial involuntary motions, which before death are sometimes converted into violent convulsions. The *treatment* should tend to remove the oppressing cause by lessening vascular distention, and to promote absorption of the extravasated fluid. Bleed, purge, and stimulate the extremities; but by no means attempt to stimulate the dormant powers by sternutories, which would inevitably increase the cerebral pressure.

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[*] This forms, in the words of M. Bouley, 'a beautiful illustration of the opinions of Bell and Majendie, respecting the functions of the *superior* and *inferior* portions of the spinal marrow.' A case detailed in the *Recueil de Méd. Vét.* describes a paralysis of the hinder parts of a horse, occasioned by disorganization of the inferior part of the dorso-lumbar portion of the spinal marrow, where there was loss of *motion*, but *sensation* remained entire. A cow also which had lately calved, who could *move* her hinder limbs with violence, but who had lost all *feeling* in them, on post-mortem examination exhibited the superior portion of the spinal rope red on its superior part, and the fasciculi proceeding from it injected for the space of two inches.

[†] 'The power of feeling and of moving is dependent on an influence proceeding from the brain to every part,' through the medium of the nerves. In a state of health it is regularly and uniformly distributed: but it is much affected by disease. It may rush on violently and without interruption, and we have *cramp* and *tetanus* or *locked-jaw*: the stream may be rapid, but with considerable suspensions, and we have *fits*, i.e. convulsions; or it may be quite suspended, and we have *palsy*.

EPILEPSY

MAY be considered as a minor apoplexy from interrupted circulation; but *epilepsia cerebralis* is without lesion; and is known among farriers and horse-men as *meagrims*, *sturdy*, or *turnsick*. It frequently attacks horses during their work, particularly in harness: it is, however, now and then seen, in hot weather, in the stable or at grass. When it seizes a horse in exercise he stops short, shakes his head, looks irresolute and wandering, and in this state he continues a few minutes, and then proceeds as before. In more violent cases he falls at once to the ground, or first runs round, and then sinks senseless: the whole system appears agitated by strong convulsion, the horse dungs and stales insensibly, is sometimes violent, and at others more passive, but is equally unconscious to every thing around in both: after remaining a longer or shorter period, his faculties return, and he rises. It is frequently brought on by mechanical causes, which produce a momentary congestion of the brain; as tight reining up, or the pressure of the collar in ascending a hill, which obstructs the return of blood from the head. It may also be occasioned by a morbid pressure produced by constitutional causes. Such are found in the full, plethoric, over-fed horse; particularly when subjected to long confinement. It may be distinguished from gripes by the suddenness of the attack, and by the horse being insensible to surrounding objects, which is never the case in colic.

The *treatment* must be regulated by the cause: if it be mechanical, remove it, or the affection may become habitual. If plethora or full habit be the apparent cause, bleed and purge; or commence by bleeding, and next give a course of mercurial alteratives, followed by, or alternated with, purging medicines: after which, turning to grass for three months greatly ensures success, by destroying the habit of the disease.

PARALYSIS.

PALSY of the whole muscular frame is very unusual in the horse, except some actual pressure or irritation be made on the sensorium by blows on the skull, by portions of bone forced in, or by cerebral tumours, effusions, or being consequent to apoplexy: sometimes it is constitutionally brought on by agencies unknown to us. *Hemiplegia*, or palsy of one side longitudinally, is even more rare*. *Paraplegia*, or paralysis of a transverse section of the body, most frequently of the hinder parts, is sufficiently common, and is either primitive or secondary. The *causes* of paraplegia are often involved in much obscurity; in other cases they are sufficiently obvious: mechanical injuries are of this kind, as casting in the stable, turning round in a confined stall, blows on the spine, sudden falls or slips may, any of them, luxate, or more likely fracture, the vertebræ; and by occasioning pressure on the spinal cord, and thus interrupting the nervous influence designed for particular parts, will occasion paralysis: ulcerations of these bones, or exostoses; or abscesses or tumours may also be the cause. It may be the result of apoplexy, or it may be altogether secondary, as being derived from accidental lesions of other organs, or from inflammations in them: it may and does occur from visceral phlegmasiæ of the stomach, bowels, liver, and more particularly from those of the kidnies, bladder, and womb[*]. These may be considered as remote causes; the proximate is an interruption to nervous influence, either in the brain or in the spinal cord: perhaps the few cases of total palsy which occur are derived from the former. Paraplegia may be often looked for in those affections of the spinal cord we have already noted. The *symptoms* are total or partial loss of either the *mobility* or the *sensibility*, or both, of some part of the body, usually of the hinder quarters and limbs. The secretions are sometimes lessened or almost stopped, or the urine flows involuntarily; convulsive twitchings affect the skin, partial sweats present themselves, and the animal remains utterly helpless, although he may fatigue himself with fruitless efforts to rise. These are, however, extreme cases.

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* Two cases are, however, detailed in the *Journal de Med. Vet. & Comparée*, which occurred in the practice of Olivier and Girard, Jun.; some particulars of which are noted in *Hurt. d'Arboval Dict. Vet. art. Paralysie.* Gibson also has met with epidemial cases of it.

The *treatment* of paralysis must, in a great degree, follow the cause. If mechanical injury have occasioned fracture in any part of the spinal column, hopeless as the case might be, it would be prudent to raise the integuments, and remove the loose or depressed portions of bone. If the injury be less severe, it is possible that extravasated blood only, or serous deposit, or coagulable lymph, are effused into the spinal canal, and disturb the functions of the part; in which case, topical applications are requisite, first to allay the increased action excited by the injury, and then to encourage an absorption of the obstructing deposit. When the paralysis can be traced to some visceral affection, as in the case below; or as it occurs in stomach staggers, nephritis, cystitis, &c. &c. our *prognosis* is not necessarily unfavourable. We should, in these cases, primarily attend to the exciting cause; next the head may be blistered, and the spine may be stimulated with warm terebinthinated dressings, and several small setons may be inserted in the course of the neck and back bone. But when there is loss of sensation without loss of motion, the limbs being cold and the horse insensible that he is in possession of such parts, and moving them only when absolutely forced; or otherwise, when they are entirely paralytic, and yet sensitive, it is probable that the nervous irritation originates within the spinal canal; and though we may with propriety use external stimulants, by blisters, setons, &c., yet there will be but small prospect of success. Of internal remedies, arsenic has been found sometimes useful; and it may be united with other tonics very properly, as gentian, cubebs, or other aromatics. The *strychnos nux vomica*, vulgarly called the crow-fig, has also been given with considerable advantage in paralysis, and should by all means be tried in morning and evening doses; commencing with eight or ten grains, which may be increased to as much as the horse will be found to bear without depression of pulse or symptoms of torpor, coma, or convulsive twitchings.

THE KUMREE.

THIS disease, so common in India, as it has been described by my old acquaintance, Mr. Morecroft, and other ingenious veterinarians in that quarter, so admirably illustrates the subject of paralysis generally, and the view I have endeavoured to give of its origin particularly, that I am tempted to intrench a little on my limits, by introducing the notices we have received on it at some length[†]. Kumree, it is evident, is a true paraplegia, or paralysis of the hinder parts of the body, the effect of serous effusion; and the knowledge of its causes and effects are useful to us, in the present instance, as identifying effusion as a consequence of exposure to cold and moist situations; and likewise inasmuch as it strengthens our attempts both in our preventive and our curative treatment.

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[*] Gibson, in 1743, notices an epidemic staggers then prevalent, in which the leading symptoms were those of paralysis; and what is more singular, of that variety so rare in the horse, hemiplegia. It was not very fatal, but, on the contrary, most of those affected recovered 'by bleeding and other plentiful evacuations, united with the constant use of cephalics, especially of castor, which had the effect of keeping the horse perspiring for three weeks; and it was observed, that the omission of the castor for one day only could not be borne without aggravating the symptoms.' It appears also as an epidemic in France, and moreover as an endemic also; in which cases it is more particularly found on the banks of rivers, in cold moist situations. Now, as these are exactly the same localities in which the kumree prevails in India, which is only a paraplegia of the lumbar region, cold and moisture may be a more general agent in nervous diseases than we at present imagine; and I throw out the hint for the veterinarian's consideration.

[†] Mr. Morecroft's account, or the mixed accounts of Messrs. Morecroft, Hughes, and Molyneux, clearly describe kumree as a mild paralytic affection, very common in India, and particularly prevalent in the periodical rainy season, as well as at all times where the country is very low and

PARALYSIS IN HORNED CATTLE.

Palsy is not altogether uncommon in the cow and the sheep, and is both *idiopathic*, from morbid affections of the brain or of the spinal marrow, and also *symptomatic*, from violent derangement of other organs. The causes, symptoms, and treatment do not essentially differ from those in the horse[*].

SPASM

APPEARS to be a morbid interruption of the ordinary movements of the general muscular fibre, whether it be local or diffused; and as these movements are operated by influence derived from the nervous system, so we look to these sources for the acting cause of all spasmodic affections. Æquine spasm bears the same division as the human, into clonic and tonic. *Clonic* spasm may be considered as identified with convulsion, which consists of diseased and violent

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swampy; thus moisture, cold air, and fog, are apparently the predisponent causes. From the mildness of its symptoms, it is mistaken often for rheumatism; for horses affected with it can move about with tolerable freedom; nor is the disease strikingly distressing at any time but when the animal *attempts to ascend or descend a hill*. Those affected can cover mares, and work moderately; but they have, under all circumstances, a decided weakness in the loins, in some more, in others less, which unfits them for the whole of the purposes that may be required of them. Mr. Hughes observes on this disease, 'that it is dependent on pressure of the spinal nerves; the relics of such inflammation of the brain or its membranes as would in the human produce hydrocephalus; but that the peculiar structure of the horse prevents the accumulation of fluid in the head, and it passes down between the theca along the spine; and which inflammation being in a minor degree, produces only slight effusion; were it greater, it would produce phrenitis.' Although this may be true, it appears to involve too many conclusions. Mr. Morecroft's original opinion of the disease appears to have been, 'that the immediate cause of kumree is an inflammatory action of the vessels, occasioning a deposition of pure blood, or of some of its constituent parts, within or upon some very important portion of the nervous system, as within the cavities of the brain, or upon its surface, or upon the sheath of the spinal marrow, or the sacral nerves, or of the large nerves of the legs soon after they leave their bony cases; and that the effects caused thereby are precisely such as might have been expected from pressure.' This opinion of Mr. Morecroft's was justly founded, as appeared by the following facts. The head of a kumree horse, destroyed for examination of the seat of glanders, was accidentally held with the occipital portion downwards, when three or four ounces of fluid escaped, which was evidently a morbid increase of that small quantity (less than a teaspoonful) usually found in the ventricles. Another kumree horse was in consequence immediately killed, which also presented a similar morbid increase of interstitial fluid, but less in quantity. A few days afterwards a very inveterate case of kumree was experimented on; an opening was made into the frontal sinus, from whence a small hole was bored through the most dependent part of the cranial bones, by which at least two ounces of fluid escaped, the removal of which relieved the animal so much, that he immediately afterwards could ascend an acclivity, which half an hour previously he could not do. With a view of permitting the exit of any fluid that might have remained, he was now placed with his posterior extremities three feet higher than the anterior, and his head was purposely depressed: the consequence was, that for ten or twelve minutes fluid continued to escape from the cranial opening. It appears, however, that notwithstanding means were taken to obviate symptomatic fever, the horse died on the tenth day. It is further observed, that in neither of these cases were any morbid appearances detected in the brain, beyond the increase of fluid. On these facts Mr. Hughes observes, 'that the increased fluid presses on the whole of the medulla spinalis in the lumbar and sacral vertebræ, and affects the nerves thence derived; and that the weakness is in proportion to the quantity of fluid in the spinal canal, and which weakness is aggravated in the degree of its descent: thus horses in kumree, who can go moderately well on level ground, on attempting a hill, stagger, and if pressed, will frequently fall, in consequence of the gravitating fluid then pressing on the lumbar and sacral portions of the spinal rope, and thus interfering with the nervous supplies to the hinder extremities.' The same gravitation, it seems, makes it equally arduous in these cases for horses to descend a hill; but here I presume Mr. H. would give as a reason, that the fluid making its way to the brain produces its paralyzing effects through that source. As evacuating the water appears to be attended with fatal consequences, so active means of promoting absorption must be the only refuge of the practitioner.

[*] 'The Director of the school at Alfort has described two maladies of this kind among sheep. The first violent and little known, attacks lambs only. At its commencement it resembles the "blood," but it afterwards connects itself with "turnsick," and speedily terminates in universal palsy. The functions of digestion are not disturbed: the animal preserves his appetite to the last moment. On dissection there has appeared inflammation of the membranes of the brain, and some hydatids scattered on these membranes. In many, the spinal canal contained much serous effusion, and the spinal marrow was softer than in a healthy state. The second disease peculiar to sheep is recognized by the name of trembling, or nervous affection. It commences with inflammation, not very intense, which is quickly followed by general loss of power. A considerable itching or eruption generally announces the attack; to this succeeds a remarkable weakness in the loins, and that is soon followed by complete palsy. Some of them linger on three or four months or longer before they die.

alternate contractions and dilatations of the muscular masses. I would claim to use spasm distinctively from either clonic or tonic irritations; not only from its indisposition to alternate its contractions with relaxations, but also, and more especially, from its acting on what I would call muscular tissues, as the ultimate fibrillæ of the muscular coats of the intestines, bloodvessels, &c. in preference to muscular masses, as defined muscles, which are more usually the seat of either convulsive or tetanic spasm. Of *spasm* we have instances in gripes; inflammation is also supposed to be an undue exercise of nervous influence on the muscular tissue of the vascular system. These various states appear to originate in a morbid excitation of the nervous system; but of what nature we do not exactly know. We witness the violence of the muscular contractions under the influence of the mind in vicious and terrified horses; we see also the same under inflammatory states of the organ in phrenitis, rabies, &c.; and we know that mechanical irritation can produce it also, perhaps by exciting an immediate inflammation; although the instantaneous spasm which follows mechanical pressure and irritation, both in the sensorium and the nerves, can hardly be accounted for thus.

In the *treatment* of spasm two indications present themselves: either to allay the *nervous excitement*, or to render the part attacked *above* or *below* the disposition to be excited. The first indication takes in such remedies as are direct sedatives, to lessen nervous excitement, as opium, hyoscyamus, belladonna, tobacco, &c.: or such as lower the nervous influence by the abstraction of vital supplies, as bleeding, purging, &c. The second indication is fulfilled by using such remedies as act by altering the susceptibility of the part, which are also bleeding, purging, and other evacuants, whose action diminishes the excess of power; such are therefore proper in plethoric subjects, or when the spasm is united with great vascular action. When, on the contrary, the spasmodic affection attacks a debile part, we use stimulants, to bring the part to a state to resist the impressions. (See *Antispasmodics* and *Tonics*, *Mat. Med.*)

TETANUS.

Tetanic spasm differs from the former affections we have lately noticed, inasmuch as here muscular contractions are not alternated, as in clonic spasm or convulsion, by alternating relaxations; on the contrary, here they remain permanent, or with very little remission. *Tetanus*, known as the *stag-evil* of some farriers, from a fancied frequency of the disease in deer; and *locked-jaw*, from the rigid closure of the mouth, may be considered as a morbid irritation of the whole or of a part of the nervous system. In my own opinion, notwithstanding that the tetanic symptoms are not always universal, and notwithstanding that dissections of cases of both idiopathic and symptomatic tetanus have presented a softening of the inferior portion of the spinal cord, yet, that the phenomena of the disease are most satisfactorily accounted for, and the curative plan of treatment best pursued, by considering it as either directly emanating from the brain itself[*], or otherwise as ultimately reaching the brain, according as it is idiopathic or as it is symptomatic.

Idiopathic tetanus is the most frequent in the horse, while the contrary is the case in the human, and its causes are some of them evident, others occult. One of the most common is that of cold, particularly when the heat of the body is abstracted by evaporation, or, in other words, when moisture is applied to the frame: thus it has followed plunging into a river during a run in the hunting season, or from injudiciously allowing a horse to stand still during a check after a severe *burst;* and more particularly likewise is it brought on by a partial but continued application of water, as when it makes its way through the roof of a building and falls in a continued drip on the body; even the drippings from the eaves of a hay-rick, standing in the field in which a horse was grazing, has produced it. It has followed visceral affections, and is supposed to be occasionally the effect of worms within the alimentary canal*. *Traumatic* or *symptomatic* tetanus is the consequence of some external injury, and it follows all kinds of lesions. Castration, nicking, docking, punctures, particularly of the feet; lacerations, and even contusions, will bring it on. I have seen it follow a fall, which presented nothing more than a moderate contusion in the shoulder. In America, it is not an unfrequent result of castration; and in some tropical climates compression of the cord in the operation must always be avoided, so apt is any irritation to produce it in these regions. It is considered as most apt to follow wounds of tendinous and ligamentous parts; but no experience of my own has justified this preference; nevertheless it may be so. A case detailed in vol. v of *The Veterinarian* would lead to a supposition that bots in vast numbers which had actually eaten through the coats of the stomach, were the direct cause. In another case detailed by the same writer, a number of terites, so great as to actually block up the small intestines, were supposed to be the existing evil.

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[*] This view appears considerably strengthened by the fact, that mechanical pressure on the brain interrupts the tetanic contractions, but which return again as soon as the pressure is taken off. The increased fatality in cases of idiopathic tetanus is probably dependent on this primary attack. When it is secondary, symptomatic, or traumatic, it may be considered as more likely to be mitigated in the course of its passage to the source, than when it springs at once, with all its force, from the fountain; and in either case it may leave morbid traces on the spinal track without detracting from its cerebrine origin.

The *symptoms*.—If a good physiologist were told that tetanus was a constant spasmodic contraction of all the voluntary muscles, he would describe the following symptoms without having seen the disease, so exactly are they characteristic of such a state. It commences usually by a certain stiffness about the throat, and difficulty in swallowing, or in turning the head, which soon extends itself to the jaws, and occasions a contracted state of the mouth, with the usual inclination to masticate, but painfully and imperfectly performed. As this increases, the jaws can hardly be separated at all, when farriers say the horse is '*jaw-set.*' By the tetanic action of the retractor muscle, the haw is drawn partly over the globe, at the same time that the tension of the other ocular muscles gives the eyes a vivid appearance and retroverted aspect, which ill accords with the more placid effect of a protruded haw. As the disease extends over the voluntary muscles of the trunk and extremities, the appearances are distressing in the extreme. The head is raised, the ears pointed forwards, the nostrils dilated, and the nose is carried out. The legs straddle wide, the tail is cocked, and quivers with the constant fatigue of the levator muscles; and the abdominal muscles are drawn tight over the belly, giving to the horse an appearance of having just completed some extraordinary exertion. The complaint presents a few moments of relaxation sometimes, from the extreme and powerful contractions of over-strained muscles; while profuse sweats mark the distress and exertions of convulsion. The circulation is, in most instances, at first not much affected; but as the disease increases, the pulse quickens, and becomes tremulous and irregular. The respiration also gradually becomes hurried and irregular; costiveness is usually present, and the urine is sparingly made. In this state the suffering animal may remain from six to ten days, when, worn out by inanition and irritation, he often falls lifeless, or expires after a short state of convulsion. At others, either remedially or spontaneously, the contractions give way slightly; feeble attempts are made to eat, the limbs become more supple, and a very slow recovery ensues.

Post-mortem appearances have often exhibited no change from a healthy state throughout the nervous system at large, in which cases it must have been an irritation without lesion or apparent inflammation. In some cases, however, there have been marks of cerebral inflammation, and in others the medulla spinalis has presented similar features: it has been found soft in structure and with its vaginal coats injected. I have seen the lungs and stomach both highly inflamed; and a slaughterer of horses told me that he seldom if ever cut up a horse which had died of stag-evil, without finding inflamed lungs[*]. The intestines also usually present inflammatory marks about them; and, as might be expected, the veins throughout the body, particularly the superficial set, are turgid with blood.

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* Gibson, who appears to have seen many cases of the disease, attributes it frequently to worms. Mr. Wilkinson also describes a case, evidently originating from the erosion of bots on the villous portion of the stomach.

Treatment.—Although the greater number of instances prove fatal, yet still a sufficient number recover to warrant our utmost endeavours: and the more so, as most of those who do survive appear to do so from the beneficial effects of the treatment adopted. The very different means which have been successfully tried might stagger the sceptic, and make him attribute the recoveries under these discordant medical agencies to constitutional strength: but there is no reason whatever for such a conclusion. This is not the only instance by many wherein very opposite means are beneficially employed for the cure of the same disease in different subjects. Every practitioner is aware of the benefit derived from cold applications in some inflammatory cases; and every one is equally aware how salutary hot fomentations prove, apparently, in similar inflammations, in other subjects. A curative end is equally produced by both: the *modus operandi* to us is not evident. This circumstance should make the veterinary practitioner not absolutely wed himself to one plan of treatment universally. When any such has been pursued without appearance of success, let another be adopted. On a supposition that the case is one of *traumatic tetanus*, it will be prudent to advert at once to the lesion.[*] If a lacerated wound be the cause, an inspection of it will usually shew an unfavourable appearance in it, and a stoppage of healthy discharge, which must be restored by warm stimulating embrocations, mustard poultices, or mild escharotics, which may establish a new action, and may *pit* a new irritation against the diseased one. In the case of a punctured wound, particularly of one in the foot, if there be a confined sinus, enlarge it, and apply the firing-iron or caustic matters freely to the orifice: and as it is found that the irritation arising from lesion can produce tetanus, even after a wound has closed, so it would be prudent in such case to open it anew. When tetanus follows docking, it is advisable to dock anew: if nicking be the cause, deepen the sections, and actively stimulate the old wounded edges. Where castration has preceded it, remove all ligature, if any remain, and foment incessantly with strong poppy liquor[†]. Having pursued this intention, it next follows to attend to the *constitutional* part of the complaint: or if it be a case of true *idiopathic tetanus*, that, of course, must at once engage the attention. It was some years ago very usual, with myself and others, to employ cold as a medical agent in this disease, which was done by removing the horse into the open air, and dashing him with the coldest water for twenty minutes, repeating the same every two or three hours, and in the interim suffering him to remain uncovered, and in the open air if the weather was not cold. In every instance this was found to mitigate the severity of the symptoms. Ice also has been applied; and the relief obtained being usually in the exact degree of heat abstracted, it was no wonder that it continued a favourite though generally a delusive practice; for as warmth returned almost invariably the convulsive contractions returned also; and therefore this method has very properly given place to others which have proved more useful; though this also need not be lost sight of, as instances have occurred of permanent benefit having been derived from it. It may, therefore, be still very properly tried, when the means which follow are not attended with success; but in that case, with the cold bath or application of ice should be united any of the other means pointed out.

The general curative practice in tetanic cases among veterinarians, foreign and

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[*] Mr. Percivall mentions two fatal cases of tetanus, in which the cuticular coat of the stomach was extensively eroded, and the internal coat injured.

[†] Baron Larrey confidently advises the removal of the injured part for the cure of tetanus. Mr. Brodie in his lectures at the College of Surgeons, in the spring of 1822, confirms this to a considerable extent. He says, 'that painful and spasmodic affections, produced by lesion of some nervous fibrils, are not relieved by a division of the nerve between the seat of injury and the brain; and that, in a few instances, an aggravation of the symptoms seems to be occasioned by the operation of neurotomy. This led him to the removal of the injured portion of the nerve, and which was attended with success.'

English, of the present day, leans to the free use of the lancet to complete opening of the bowels, and to a liberal administration of opiates, as being every one of them powerful antispasmodics singly, but in this painful affection proving doubly so conjointly; to which are added, blistering the spine; and the beneficial effects of this practice, as exemplified by experience, warrant its being at once proceeded on to the exclusion of every other, until it has totally failed[*]. First, therefore, abstract blood; a large horse, in full condition may with propriety lose eight or ten quarts in a desperate case; and an additional reason why this ought to precede any attempts to give internal remedies is, because when the quantity of blood abstracted is sufficiently large, some relaxation of the spasms generally takes place, and medicine can be more readily given, and the momentary relaxation should be seized on to give a purgative. The croton, as acting more speedily, offers itself first to notice; it is also small in compass, and may therefore be administered in substance, under circumstances of almost entire closure of the jaws. Twenty-five or even thirty grains of the farina of the nut may be given at first, and one-third of the quantity first administered should be repeated every five or six hours, until full purgation occurs. If aloes be preferred, it will be not only more convenient, but they will operate more quickly and in smaller quantity also (see note below), if they be given in solution. If a prejudice exists in favour of a mercurial purgative, calomel may be given previously, to the amount of two drachms, in a small ball placed on the end of a long probang, in which case six or seven drachms of aloes will suffice; but without calomel ten drachms in substance will not be too much for a strong, full-sized horse (in solution eight drachms are sufficient); and it will probably require two drachms more, repeated two or three times at intervals of five or six hours, ere a complete emptying of the bowels is made, such is the constringed state of the intestines frequently at these times; laxative clysters (after the back has been properly raked) must also assist the attempts, which should be thrown up in large quantities and frequently repeated, which must be retained by pressure on the anus by an assistant, or it will be thrown out with violence by the intestinal rigor present in these cases. We know it to be a practice with some veterinarians to unite digitalis and camphor with aloes, but it does not appear that any marked benefit has resulted therefrom. With others, extensive vesication over the spine from the poll to the tail has succeeded.

It will not be wondered at, after what has appeared at the outset of this class of diseases, if we should make external stimulation of the nervous system a very important consideration. In idiopathic tetanus I have blistered the skull or inserted a rowel or two at the nape of the neck, stimulating it with blistering ointment. In traumatic tetanus I sometimes also did the same; but in every instance, idiopathic or traumatic, as soon as the former indications have been fulfilled, clip or shave the hair close, and then proceed to blister the whole spine, beginning at the back of the head, and the sides of the neck, in the course of the cervical vertebræ which dip down deep within the substance; but a little beyond the withers recommence the blister on the margin, and rub it in most actively along the spine to the root of the tail, and renew the ointment every day. Some veterinarians in preference insert setons in this course; I prefer vesicants. The spinal track throughout having been stimulated as directed, as soon as a soluble state of bowels is established, proceed to give the following: it is certainly desirable that the bowels should be first opened; but if the irritation be extreme, and the back has been raked, clysters thrown up, and an active purgative have entered the stomach, I should recommend not to wait the operation of purging, but to give the sedative, and then renew the attempts at unlocking the bowels.

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[*] It must be remembered that a prompt, bold, and continued treatment is required. It must be prompt, because no time is to be lost in attacking such a foe, and that if possible before the full rigor of the jaws is established: let each indication be therefore *immediately* followed up by another. It must be bold, nor must we be deterred, by analogy either with the human or with other diseases, from giving extra doses either of opium or camphor, as sedatives; or of croton, aloes, &c. as purgatives, for very large quantities are here borne with impunity. As regards *the modes of administering medicines*, as long as the muscular contractions of the jaws do not entirely close it, solid masses may be given from off the end of a long piece of whalebone, cane, &c. which being dislodged from the cane into the back part of the mouth, will at once be swallowed, or will slowly dissolve and pass down. Liquid medicines may be given with a syringe passed between the molar teeth and jaw; or as the inferior meatus of the nasal fossæ are in a direct line with the œsophageal opening when the head is elevated, so we can, under urgent circumstances, introduce liquid matters, not actively stimulating, into the stomach by this way. I, however, merely notice these methods as resorts in case of necessity; for no prudent veterinarian should be without a stomach pump and clyster syringe; indeed, one article is now made to answer both purposes. By the introduction of the œsophagus tube through the side of the mouth, any quantity of liquid matter may readily be introduced into the stomach, the advantages of which are numerous and important. It is very painful to elevate the head of the horse for the purpose of nasal injections, and frequently likewise medicines or other liquids thus given return, or they occasion painful irritation in their passage: it is little less so to attempt it by a bottle introduced between the lips and jaw; but by the stomach syringe the whole difficulty is avoided. Another very important advantage is also gained by this facility of giving *liquid* over *solid* medicines. Purgatives particularly, act much more speedily and with less constitutional irritation in *solution*, and it requires one-third less in quantity of the actual purgative article when in solution than in substance to effect what is required. Lastly, by means of the stomach syringe, liquid nutriment in any quantity can be introduced into the stomach, and as often as required, without inconvenience to the operator or distress to the animal.

No. 1.—Powdered opium	two drachms
Camphor	two drachms
Carbonated ammonia *(spirit of hartshorn)*	one ounce
Spirit of turpentine	two ounces
Strong ale	a pint.

Mix, and repeat either the half or the whole of a similar dose, as the urgency of the symptoms may require, every two or three hours. Throw up the following clyster also after the bowels are cleared, which repeat at intervals of an hour to two.

No. 2.—Boil twenty poppy heads in six quarts of water to a gallon, add
Camphor dissolved in spirit, one ounce.

On the subject of a repetition of the bleeding to any considerable extent, some difference of opinion probably may prevail, and it does require a collation of a vast number of cases to decide peremptorily on the subject. One very full bleeding, except at the very close of the complaint, I have invariably found to calm the hurried pulse; but the repetition, at least to any extent, ought to depend on circumstances. If the case is far advanced, and the animal is neither a plethoric nor a young one, it might be well to try the full effect of the tonic plan, without another full bleeding; but when a case the reverse of this occurs, and one marked with extreme rigor in the tetanic symptoms, the repetition of bleeding and the continuance of it may be very properly tried, and that as long as it calms the hurried pulse. The tetanic irritation being confined to the motive organs, so the digestive faculties usually remain undisturbed; and if the horse could eat, it is probable that, in many cases, he might become so nourished as eventually to wear out the disease without medicine even. Nutriment should, therefore, be artificially and liberally supplied by means of the stomach pump, in the form of gruel, or the liquid sediment from malt mashes: now and then small quantities of the mash itself, if offered, can be sucked in by the hungry animal. I have also given tripe liquor and gruel as clysters, in which way much nutriment may be thrown into the constitution. But in pursuing the tonic plan, the necessity of avoiding costiveness throughout must not be lost sight of; on the contrary, the moment it appears it must be again combated, as it immediately aggravates the tetanic rigors. In all other respects a steady perseverance in the plan now laid down should be adhered to, and, in addition, the methods recommended by Mr. Wilkinson, of Newcastle, of subjecting the horse to a very warm temperature, to very active and universal frictions, and, during the intervals, clothing of the body in new sheep skins, may, with great propriety, be adopted also, from the very general experience of their efficacy in many instances.

SPASMODIC COLIC.—(See CLASS V.)

STRINGHALT.

MR. Feron informs us, that this singular spasmodic affection is esteemed graceful in some continental countries; at least when it exists in both hinder legs, as it occasionally but not frequently does: very seldom indeed is it found in the fore, of which I have seen but one or two instances at the most. It is evidently a spasmodic contraction of some one or more of the flexors of the leg, which usually ceases after the animal has been some time in motion, the consequence of local irritation or of pressure on some nervous fibril, or of some habitual diseased action such nerve takes on, which the excitement of exercise renders less acute. It is not hereditary or congenital, and seldom appears until the approach to the adult age. Mr. Sewell thought he had discovered its source from finding a cyst within the belly of the triceps adductor muscle, through which the nervous trunks pass; but although this probably was here the cause of the affection, yet renewed dissections, I believe, have failed to afford us any light on the subject. It, fortunately, does not injure the horse beyond its unsightliness.

CLASS V.

DISEASES OF THE ALIMENTARY CANAL.

SPASMODIC COLIC.

SPASMODIC COLIC is the disease known to farriers by the terms *gripes*, *cramp*, *fret*, and *gullion*. The muscular tunic of the intestines renders them very susceptible of the action of spasm, and the vascularity of their villous surface renders them very liable to become primary agents in the production of this irritation. Spasmodic colic appears more apt to affect the small intestines than the large; but instances are not wanting to prove that the large intestines also become occasionally affected; and when the spasm extends to the posterior part of the cæcum and rectum also, the bladder sometimes participates in the convulsion, and frequent ejections of urine occur. Mr. Peal has observed, that in some cases the neck of the bladder has participated in the spasm, in which, on the contrary, suppression of urine would occur. That colic is dependent on a spasm of the muscular structure of the intestines, we have proofs from the appearances which present themselves after death, in fatal cases, when different portions of the alimentary track will be found forcibly contracted; certainly much oftener in the small than in the large intestines, but not without instances of the larger participating in the affection; and in the few instances where much flatus has been present (although it is improperly in the horse called flatulent colic), the post-mortem appearances have proved that the cæcum and colon were the principal sufferers, apparently from the disengagement of an injurious gas from undigested herbage, particularly from leaves and hedge browsing.

The *causes* are various: the sudden application of cold either to the surface of the skin when hot; or to the intestines under similar circumstances in the shape of cold water drunk hastily, and when the horse has been warm; in which latter case the attack often soon follows. Costiveness will bring it on. Tumours in the mesentery and strictures in the bowels are also the sources of occasional colic: and when a horse is found to be subject to repeated attacks, something of this kind, or otherwise calculous concretions, may be suspected; and I have known many instances where habitual colic was present, dependent on these causes. Horses long confined to dry food will sometimes get it by suddenly gorging themselves with green meat; and with others, a constitutional tendency from some occult cause gives them a predisposition to it.

The *symptoms* of spasmodic colic are usually sudden in their appearance, and not marked, as in inflammation of the bowels, by previous indisposition; but the horse is observed to be at once attacked with considerable uneasiness, shifting his position from side to side, pawing his litter, and stamping with his feet impatiently. After a few minutes thus passed, the pain remits, and leaves the horse tolerably easy; when in enteritis no perfect remission occurs, but all is one scene of nearly equable pain and distress. As the colic advances, the remissions are less perfect, and less frequent: the horse now lies down frequently, and on rising shakes himself, looking round to his sides, which occasionally, in desperate cases, he snaps at with his teeth; but more frequently he is seen to strike with his hind feet at his belly, as though determined to remove by force the cause of his pain. In enteritis this acuteness of sensation or violence of temper is seldom seen. When on the ground, it is not uncommon for the horse to roll on his back; sometimes he will remain in this situation for a few seconds, or he will roll over; neither of which are usually done in simple inflammation. In colic the pulse is seldom much altered from its natural state, unless the colic have existed some time, when it occasionally presents marks of general irritation, and is not only quickened, but also somewhat hardened. If felt also during the intensity of the paroxysms, it will likewise be often found to be disturbed even in the early stage, but this is momentary only, and ceases on the remission of the pain. If, therefore, the junior practitioner should choose this period for forming his criteria of the disease, he may be misled; for under the immediate influence of the existing spasm, it will in some instances present a full bounding accelerated stroke, but more often a wiry thready though quickened beat, both which may, therefore, be mistaken for inflammation. The extremities, as the legs and ears, in colic are not often much affected, and they never remain intensely cold for a considerable period, as in enteritis; but the coat stares, and the horse breaks out frequently into cold sweats. In colic, also, relief is obtained by friction and motion, but both aggravate the distress in enteritis. Sometimes he is seen to attempt to stale without effect, at others he stales frequently, with momentary relief.

Treatment.—Having reason to believe that the patient is labouring under simple spasm of the intestines, unmixed with inflammatory tendency derived from idiopathic enteritis; or symptomatic irritation from inversion, involution, invagination, or intussusception of the intestinal track; proceed at once to administer such one or more of the numberless antispasmodic remedies as custom and experience have warranted the use of*. Numerous as they are, there is not one

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* At the Veterinary College, ol. tereb. is much relied on: and when united with opium, is still more efficacious. In *The Veterinarian*, a Mr. Paris recommends, from his own experience, four ounces of the oil of turpentine, tincture of assafœtida, spirit of nitrous æther, and of spirit of hartshorn, each an ounce; to be given, and the same to be repeated every second or third hour; but, after the third or fourth dose, to be united with one ounce of laudanum. He has given, he informs us, in less than twenty-four hours a quart of the turpentine and half a pint each of the other articles, and asserts that the practice is invariably successful. There is no denying facts, and, under spasmodic constriction, the stomach and bowels are but little subject to the influence of *ordinary* stimuli, and will receive very powerful doses as remedies, which, under other circumstances, would prove poisonous. In the course of my human medical practice, I have witnessed many instances of this insusceptibility to ordinary stimuli. a very extraordinary one is strongly impressed on my memory, where spasm from procidentia uteri could only be calmed by doses of tinct. opii two drachms, æther vit. three drachms; which were repeated twice within two hours, without the smallest disturbance to the system either at the time or afterwards. In the horse, also, I have no doubt but cases do occur where these quantities might not only be given with impunity, but benefit also: but woe to the poor animal which has the smallest tendency to inflammation, and we should recommend to the advocates of this practice, as a safer and equally efficacious plan, that the quantities be lessened and accompanied from the very first with tincture of opium half an ounce. From the same source (*The Veterinarian*) we find a recommendation from Mr. Gregory, of Warminster, as a colic remedy, powdered opium, ten drachms; horseradish, two ounces; powdered capsicum, one ounce; spirit of nitrous æther, one pound: macerate fourteen days. Of this preparation, this gentleman recommends one ounce with two ounces of nitrous æther, to be given, and to be repeated every two hours as long as is necessary; observing that his reason for preferring this to turpentine is occasioned by the liability in turpentine to blister the mouth and fauces, and sometimes producing violent purging; and in one case, after giving six ounces mixed with a pint of oil, although it relieved the pain, it inflamed the fauces, and produced a cough, which has remained ever since. It is not stated whether this quantity was given at once, but if so the vesication need not be wondered at. Ol. tereb. may be much sheathed from this effect by mixing the other matters intimately with it, by means of the yolks of eggs: in which way no injury of this kind, by a moderate dose of from two to four ounces, can be sustained. Mr. Percivall recommends opium as the sheet anchor, and unites aloes with it in decoction, considering that this union combines the desirable ultimatum of opening the bowels after it has relieved the spasm. Mr. Youatt also recommends a similar plan, 'if it be clearly a case of colic;' which is a very proper caution, both as regards the use of aloes, and of the other active stimulants. Mr. Peal gives laudanum one ounce, oil of peppermint thirty drops, in mild cases; and in those more acute, tinct. opii, one ounce and a half; ol. tereb. vol. one ounce; ol. menth. pip. forty grains.

Mr. Bracy Clark has such a dependence on the pimento or pepper, as a remedy for spasmodic colic, that he has written an express treatise on its virtues. His formula is a pound of the pepper ground fine and steeped in spirits of wine three pints, and of water three pints. Of this tincture a quarter of a pint is a dose, to be repeated every hour until relief be obtained. The use of pepper has long been in vogue among farriers and graziers; and although in many instances it is without doubt an excellent that has not its advocate, and perhaps not one that does not deserve it, so simple are the means sometimes required; and so much is the constitution prone, in some cases, to assist itself or our efforts. While, at the same time, other cases occur sufficiently obstinate and sufficiently fatal to require all our energies and all our discrimination in the choice of our remedies, I can confidently speak to the antispasmodic qualities of the following, which should one or either of them be given as soon as possible, and repeated in one, two, three, or four hours, according to the violence of the symptoms, if no benefit be apparent from the first dose; for it must be remembered, that what we do we must do quickly, to prevent inflammation, for, of the fatal cases, four-fifths shew evident marks of enteritic attack on a post-mortem examination.

No. 1.—	Ground pepper	half an ounce
	Spirit of turpentine	three ounces
	Tincture of opium	one ounce
	Sound ale	four ounces.

Mix.

No. 2.—	Spirit of vitriolic æther	one ounce
	Tincture of opium (*laudanum*)	two ounces
	Oil of peppermint	one drachm
	Common gin, and sound ale, of each	a quarter of a pint.
No. 3.—	Spirit of turpentine	two ounces
	Oil of peppermint	one drachm
	Castor oil, and watery tincture of aloes (*Mat. Med.*), each	six ounces*.

As a domestic remedy, and one which has relieved at the moment, when other medicaments were not at hand, I would recommend the following:—

Ground pepper	a tea-spoonful
Common gin, and sound ale, of each	a quarter of a pint
The juice of two or three large onions.	

The antispasmodic having been given, the necessity of bleeding should be next taken into consideration: if the case be one of very acute features, I would recommend that it be proceeded with without delay, and, according to the degree of intensity or duration of the complaint, do it more or less liberally. Extensive bleeding, it should be remembered, is one of the most powerful relaxers of spasmodic constriction with which we are acquainted; and instead of its being

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spicy stimulant, yet it does not appear to possess any specific qualities over other aromatics. Among the French, the list of medicaments is equally or even more numerous. La Fosse's favourite remedy, which used to be practised also by the old English farriers, consisted of a mixture of onions, savin, and pepper pounded together, and introduced as far as possible within the rectum, after which the horse was moved briskly about. We are inclined to pay much deference to the modern veterinary therapeutics of the French schools; but if M. Hurtrel d'Arboval is as accurate a herald of their practice in this case as in others, it is, at least, not a very active or a very bold one, as displayed by the following general directions for the treatment under the article *Colique*: 'Dès le début, on doit mettre en usage les calmans et les délavans, et les administrer en grande quantité. L'eau tiède salée, donnée en assez grande abondance après les premiers momens, est un bon-moyen, dont nous avous été souvent à même de constater l'efficacité. L'huile d'olive, mêlée au vin ou à l'eau-de-vie, le poivre, l'eau-de-vie et le nitre, le vin chaud avec un sucre, de la cannelle, de la thériaque, et mille autres recettes de ce genre, dont la plupart des maréchaux abusent, ne peuvent qu'exalter l'inflammation, et sont par consequent toujours nuisibles, surtout dans les commencemens. Il ne faut pas négliger la promenade au pas, les bouchonnemens fréquens, et les couvertures légères, qui favorisent toujours les effets des premiers moyens mis en usage. Dans le cas où le mal est plus grave et compliqué de colique venteuse ou inflammatoire, le pouls est dur, et une petite saignée peut le développer; mais il est plus avantageux de la faire locale, en ouvrant la veine sous-cutanée qui rampe dans les parois inférieures du ventre. Lorsque le spasme parvient à un certain degré, on doit avoir recours aux medicamens susceptibles de calmer les irritations nerveuses, et un peu toniques en même temps, tels que l'infusion de camomille, avec de l'éther sulfurique. L'éther est, dans ce cas et dans celui des coliques venteuses et d'indigestion, un médicament souvent héroïque; on l'administre au cheval et ou bœuf à la dose d'une demi-once à trois onces. Les lavemens d'eau tiède doivent en outre être prodigués, et l'on ajoute du nitrate de potasse aux boissons, qui doivent toujours être tièdes.

* The recipe No. 3 is more particularly proper when costiveness is present from the beginning, and when it continues unrelieved after back-raking and clysters have been given, which in every instance of violent colic should be done according to the directions laid down.

an antagonist to the antispasmodic treatment usually adopted by internal remedies, its relaxant qualities are found to be infinitely increased in efficacy when conjoined with large doses of opium. I have had so many opportunities of witnessing the effect of this combination, that I cannot too strongly recommend it[*]: and although most of the ordinary cases of spasmodic colic will yield to the common stimulant treatment, and many would even go off without any treatment at all, yet bleeding in mild cases even is always safe and precautionary against inflammation; and in the more aggravated it is essentially necessary both to combat the inflammatory tendency, and to promote the relaxation of the spasmodic irritation on the muscular fibre. It is likewise particularly indicated in these violent or protracted cases, to counteract the irritative qualities of the antispasmodics used, which, though in other instances of simple spasm are innocuous, however large, yet may not prove so when reaction is at hand, or already begun. It should, however, be remembered, that though I advocate bleeding, it is not that useless and non-medical practice of bleeding by the palate or sublingual vessels; and though, with Mr. Peal, I would most strongly condemn violent and particularly long-continued exercise, yet I have so frequently experienced the good effects of a brisk trot for ten minutes, that I cannot but recommend its adoption. Friction to the belly is also to be employed, by means of a brush, or if with a heated coarse woollen cloth it will be better; but the practice of rubbing with a stick is, I apprehend, worse than useless, and often hurtful. Fomentations of very hot water are also sometimes singularly efficacious; and in every case we should, by means of the patent syringe, throw up considerable quantities of relaxant clysters; and where costiveness is present, until the bowels be relieved of their fæcal matter the clysters should be of a mild watery solution of aloes, or, by preference, of a solution of sulphate of magnesia (Epsom salts) in broth, gruel, &c. Afterwards the clysters may be made media of applying antispasmodics to the bowels, as decoctions of poppy heads, or even tinct. opii, largely diluted with warm water, &c.

COLIC IN HORNED CATTLE.

Oxen and cows are subject to this complaint, but which does not differ in symptoms or treatment from that of horses. There is likewise, at times, a species of colic observed among cattle, arising from *costiveness;* in which cases the hardened fæces accumulate, and the liquid parts make their way through them, or by their side. This is called among farmers, drovers, &c., *fardal-bound*, and is very dangerous, from the deceitful appearance it puts on, being frequently mistaken for purging. It is evident this can only be cured by brisk purgatives; and if the obstructing mass be within the reach of the arm, back-raking should be resorted to. Bleed, also, to prevent inflammation.

CHRONIC INDIGESTION.

HORSES are subject to dyspepsia, or loss of appetite, either from some morbid change in the stomach, some disease in its secretions, or the presence of some extraneous matter. We have had many occasions to advert to the sympathy existing between various parts, and the present is a prominent instance of the same; for in every case of stomach affection the skin is found to sympathize; and these states are therefore always accompanied with staring hair, dry, and but little unctuous, from constricted sebaceous glands: it also presents that inelasticity of cuticle termed *hide-bound.* The horse continues to eat without appetite, or with one irregular in its desires; and what is taken in is frequently passed away nearly in the state in which it was eaten.

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[*] The practice of uniting bleeding with antispasmodics is now common in both brute and human therapeutics; and the relaxant qualities of this combination in spasmodic contractions is a pathological fact well established; it being very generally observed, that, under spasm, stimulants seldom hurry the circulation into inflammatory diathesis. The morbid irritation itself may end in inflammation, and when that is established, then stimulants are prejudicial; but previous to this our antispasmodics must be antiphlogistics also.

Causes.—In spring and autumn, when a renewal of hair takes place, the sympathy between the skin and stomach produces the phenomena so usually observed of faintness, perspiration, and irregular appetite. It is sometimes occasioned by the presence of worms, when their numbers are great: more often, however, it may be attributed to improper food, as musty hay or corn, unventilated or overheated stables, too great a quantity of clothing, the injudicious use of spicy stimulants, as cordials, &c. &c.

Cure.—Its removal must, in a great measure, depend on becoming acquainted with its cause. In spring, feed succulently; and in autumn, feed liberally; which will, in both cases, encourage that particular growth of hair which the season requires. The *medical treatment* proper may be gained by a reference to *Morbid Condition;* to *Stomachics (Mat. Med.);* and to *Worms.*

ACUTE INDIGESTION, POPULARLY KNOWN AS STOMACH STAGGERS.

Horses are subject to an acute affection arising from *mechanical distention*, which utterly prevents the process of digestion going forwards; and the consequence is, a symptomatic phrenitis, which has gained it the name of stomach staggers: but as other visceral affections occasionally beget a symptomatic phrenitis, the disease, as a whole or comprehensive affection, was considered in Class II. I shall, therefore, here confine myself to a notice of it as a simple state of *hoving*, and refer the reader for the pathology to Symptomatic Phrenitis, p, 305. *Stomach staggers from distention* is much less frequent to horses than to cattle, but it is much more fatal when it does occur to the former than to the latter; both of which circumstances are readily accounted for when we consider the structural peculiarities of the two animals. When this affection was first called stomach staggers, it was considered that the distention observed was confined to the stomach only; but experience has taught us, that though it is there that it exerts its greatest intensity of symptom, yet that mechanical distention from enormous eating, followed by indigestion and extrication of gas, takes place in the intestines also, particularly in the large intestines. In the horse, stomach staggers is often the consequence of voracious eating after long fasting. It more particularly follows the eating of bran, chaff, pollard, or such food as can be gathered up quickly, when it is swallowed without much mastication, and consequently without insalivation also; by which the horse increases the calls on his stomach, and yet lessens its means by depriving it of the aids of the diluting and solvent saliva, as well as by the existing debility of the organ from previous inanition. In the stomach, it is probable that it is the mechanical distention from actual material bulk that is the noxious agent, particularly when it follows eating of dry food, for the extrication of gas is here seldom found to be enormous. When the distention is found within the intestines, on the contrary, there is usually a very large extrication of gas, for it is then often consequent on eating such substances as are prone to an early fermentation, as succulent grasses, new hay, or injurious browsings of hedge-tops, leaves, &c.; in which case, as the collection and mastication of these allow time for the matters to be passed quickly through the stomach, according to the usual course into the intestines, it is in them that the principal decomposition takes place; and the presence of the gas must be looked on here as an equal agent in the distention, as the material bulk of the food itself.

The *treatment*, therefore, of the *hoven of horses* will be somewhat altered as we view it in one or other of these lights; but, as a whole, it will present three indications: first, that of dislodging the mass; secondly, neutralizing the gas evolved from it; thirdly, combating the symptomatic effects produced by it; for which latter we refer to *Symptomatic Phrenitis*. In the true stomach staggers, we must attempt to dislodge the mass by means of diluting it with the stomach syringe, by which, when we are called on sufficiently early, we may often succeed in rendering it so soluble as to readily pass off by the pylorus. If gaseous distention be found to accompany it, that may be treated by the means yet to be noticed. When *intestinal distention* is the acting agent, it is, as already observed, very usually dependent on the fermentation of green or nearly green food, and less frequently from bran, pollard, meal, &c. &c., which commonly confine their effects to the stomach. In such cases, our efforts must be directed to the neutralization of the gas even more than to the abstraction of the food. Cases, however, do occur, where stomachic and intestinal distention are mixed, which can only be known by the degree of coma, the intensity of the distress evinced, and the drum-like tension of the abdominal parietes, which latter is less evident in pure stomach staggers, but always is a prominent symptom in intestinal hoving. Here we must, in some measure, combine the two indications of cure, that of displacing the mass, and that of neutralizing the gas; the former by the patent syringe, used both by the mouth and by repeated and full clysterings; the latter by the neutralization of the gas by such means as have been already detailed, p. 369; or more effectually (as it would appear by some lately developed facts) by *chloruret of potash*, as detailed in the hoving of cattle.

ACUTE INDIGESTION IN CATTLE, CALLED HOVE, OR BLOWS.

When cattle have become fatigued by driving or by long fasting, and suddenly find themselves with plenty of food before them, particularly of such as requires little mastication, as chaff, bran, grains, &c. &c.: and also at all times when they meet with food they have long been deprived of, as various artificial grasses, particularly red clover, they are apt to eat greedily, and omit to stop for the purposes of rumination; by which means the rumen or paunch becomes so distended as to be incapable of expelling its contents. From this, fermentation begins to take place, and a large quantity of gas escapes, which increases the distention, until the stomach either bursts, or, by its pressure on the diaphragm, suffocates the animal.

The *symptoms* are uneasiness and distress, with quickened respiration, and sometimes there is a degree of phrensy present. When it is occasioned by green food, the evolution of gas is enormous, and the tympanitis gives a drum-like distention to the belly; but when dry food, as chaff, bran, &c. &c. has been taken, the impacted matter does not distend so quickly, and the symptoms are less acute, and more resemble those of constipation. It is thought to be more likely to occur in warm and wet weather than in any other; and if such be the case, it must arise from the state of the vegetable matter and the surrounding warmth being both favourable to fermentation.

The *treatment* will consist in attempting to urge the distending mass through the alimentary track: if that be impracticable, we must lessen the distention by *evacuating* the distending gas, or otherwise try to neutralize it. Purgatives have little or no effect in this case; but the stomach pump has loosened the impacted mass, particularly in cases where dry food has been taken in. See an interesting account of a case of this kind in *The Veterinarian*, vol. iii. The *evacuation of the gases* is made by instruments (a probang usually) passed down the œsophagus*; or it is done by puncturing the side, for the urgency of distention or the want of assistance renders it sometimes imperative to evacuate the gas immediately, to prevent suffocation, or rupture of the rumen; a puncture is therefore at once made into it, which, among graziers, is called *paunching*. When nothing better is at hand, this may be performed with a lancet, or even a penknife; the place of puncture being midway between the ileum or haunch-bone and the last rib on the *left* side, to which the first stomach or paunch inclines. The veterinarian will, however, always perform the operation with a proper trochar[*], which instrument will permit the gas to escape certainly and quickly; at the same time that it will prevent its escape into the cavity of the abdomen, which would occasion an equal distention. As soon as the air is perfectly evacuated, and the paunch is observed to resume its office, the *trochar* may be removed, and the wound carefully closed with a pitch plaister, or other adhesive matter. It is necessary to observe, that this operation is so simple and safe, that, whenever a medical assistant cannot be obtained, no person should hesitate a moment about doing it himself. The domestic remedies for lessening the distention, by condensing the gas, have been various, as oil, and particularly ammonia prepared, a strong solution of which in water has been found serviceable. The alkalies generally have long been used with variable success. Vinegar, in the *Quarterly Journal of Agriculture*, is strongly recommended; but as it is observed that the elastic fluids developed are not always alike, so the effects resulting from the most reputed agents have too often failed; but from what appears below, we will hope that we have yet a strong hold in reserve[†]. To Mr. Youatt we owe the introduction (as a remedy in hoven) of the chlorinated lime given in doses of from ʒij to ʒiv suspended in water.

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* That principally in use is the invention of Dr. Monro, of Edinburgh, and which is particularly described in the *list of veterinary instruments* at the end. Another, consisting of a cane of six feet in length, and of considerable diameter, having a bulbous knob of wood, has been invented by a Mr. Eager, which is a more simple machine, but hardly so efficacious. It is probable that, in cases of emergency, even the larger end of a common cart whip, dexterously used, might answer the end. The introduction of any of these instruments may be effected by the help of an assistant, who should hold the horn of the animal by one hand, and the dividing cartilage of the nose with the other, while the operator himself, taking the tongue in his left hand, employs his right in skilfully and carefully introducing the instrument; the assistant bringing the head and neck into such an attitude as to make the passage nearly straight, which will greatly facilitate the operation. By these means the probang may be readily introduced, which is known by a large quantity of air immediately rushing out.

LAMPAS.

THIS tumefaction of the rugæ, or bars of the palate, not unfrequent among young horses, is sometimes occasioned from the later dentitions, and at others is dependent on some derangement of the alimentary canal. It is very common to young horses when first stabled, from the inflammatory tendency of a change of food, confinement, &c. Farriers are apt to regard these tumefactions of the roof of the mouth as local evils of the part itself; they therefore burn or stimulate them without mercy, not at all looking to the cause. In these cases examine the mouth generally, to see whether teething be going on; and if the gums appear tumid, particularly those opposed to the tushes, or any other un-protruded teeth in younger horses, touch them slightly with a lancet or bistoury; and do the same to the tumefied bars If it be evidently not the result of teething, examine the general condition, and the probable circumstance of derangement of the alimentary canal. Are there any appearances of worms? Has there been any late change of food? or has the horse been lately much confined? If none of these causes are apparent, it is yet more than probable that some lassitude may be detected: that the hair, hide, &c. will indicate some affection of stomach and general want of condition. In all which cases treat as directed under the head *Condition* (Section vi, p. 67.) Any application to the rugæ themselves should be of the mildest kind: if scarified, do it very lightly; and afterwards touch them daily with the oxymellate of copper (*ægyptiacum*).

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[*] M. Chretien, a foreign veterinary surgeon, describes an effective trochar made of tin or silver, six inches in length, and of one common bore; the tube being pierced with small holes, to give vent to the gas and frothy matters in case the mouth of the tube becomes choaked. A metallic plate, soldered to it externally, about the third of an inch below the superior end of the canula, defends the wound from the ejected matters; and through this two holes are punched, one above, the other below, to which the circular band around the cow is attached, to retain the tube in its place; which band will require tightening, according as the distention of the belly becomes relieved. When the gas has made its escape, the mouth of the tube is closed with a cork, to prevent the entrance of the external air; and five or six hours afterwards, providing no fresh gas is disengaged, on the removal of the cork, the canula may be withdrawn. This precaution is useful; for in some mephitic indigestions, complicated with distention of the paunch, it is occasionally necessary to leave the canula in for several days, in consequence of a renewal of the fermentation. A lesser trochar, of a similar kind, is made for sheep; and as the use of tin canulas will obviate the principal expense of the instruments, it would be prudent in every farmer and grazier to possess himself of them.

[†] My confined limits ill accord with minuteness of detail; but my wish to afford the student a comprehensive vade-mecum of practice makes me regret omitting any thing that may be useful: thus I am forced to enter by a note what would swell the text of my pages beyond their capacity. The *Bulletin de Pharmacie* states, that the gas produced from fermentative matters within the rumen, when analyzed, yielded sulphuretted hydrogen 80 parts, carbonated hydrogen 15, and carbonic acid 5 parts. Mr. Plugh, in the *Edinburgh Journal of Science*, gives three-fifths of carbonic acid, and two-fifths of carbonic oxide gas. These different analyses have awakened the attention of Chabert, Barrier, Fremi, Lameyan, and, lastly, of M. Charlot, who, after much apparent inquiry, is led to the conclusion, that the intestinal gases are principally composed of hydrogen and its compounds; and that the distentions in which they escape may be considered as *recent* and *chronic*. In recent indigestions, or such as result from the first fermentation of vegetable matter, carburetted hydrogen prevails. In chronic indigestion, or that which follows the use of dry food, sulphuretted hydrogen predominates. M. Charlot was next led to a conclusion, that, since hydrogen was predominant in these gaseous products, it was only necessary to select a substance which had a strong affinity for that gas (hydrogen), in order to induce it to enter into new combinations, and consequently to condense it. The substance chosen was *chloruret of potash*, which is to be administered in *hoving*, not only of sheep and cows, but of horses also. It is to be given in water, but not in wine, oil, mucilages, or decoctions of bitter or aromatic herbs; but if any mixture be required, sulphuric æther may be added without fear of neutralizing the action of the medicine by the great affinity of matter added for chlorine. The dose for the horse is one ounce; for the cow half an ounce; and for the sheep a quarter of an ounce, in two, three, or four ounces of water. As far as the trials are detailed in the practice of several veterinarians, on numerous distinct cases, they are highly satisfactory; and warrant our hope that this destructive malady may be hereafter less fatal. For further particulars I would refer to *The Veterinarian*, vol. iv.

WORMS.

EVERY part of animated existence appears subservient to the purposes of other portions of it; and therefore every thing living may be considered as parasitic, clinging around other living matter for support. Insects, in an especial manner, appear to deserve this character; for many of them actually entomb themselves within other animals, either as their constant habitation, or as temporaneous tenants during their existence in some particular state. The intestinal worms of the horse are *Lumbrici*, which resemble the earth-worm, and are not uncommon in the small intestines, where they occasionally do mischief by their irritation. *Ascaris*, or thread-worms, so called from their filamentary figure, are darker and larger in the horse than in man, and reside in the rectum and cæcum occasionally, and when they exist in large numbers may prove prejudicial. The late Mr. Percivall attributed the death of two horses to their presence. (See *Veterinarian*, vol. ii.) *Trichocephalus equi*, or whip-worm, is now and then found in the horse; but of its effects I know nothing. *Tænia*, or tape-worm, is but seldom found, and its effects therefore have been little noticed. *Bots* are the larvæ or grubs of the œstrus or gad-fly; and our knowledge of the natural history of this genus has been much extended by that able naturalist and veterinarian, Mr. Bracy Clark*. I cannot, however, agree with him that they are always innocuous: on the contrary, I have seen cases of fatality brought on by them. Mr. Coleman relates an instance where they had eroded the stomach, and from thence had penetrated the diaphragm also. Mr. Cartwright, of Whitchurch, in *The Veterinarian*, gives a remarkable instance of their injurious consequences: these, however, are rare.

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* This gentleman, in his elaborate *Treatise on the Bots of Horses*, informs us that the genus œstrus furnishes several species, three of which he has figured, and described as peculiar to the horse, to which I believe he has since added a fourth. These are *œstrus equi*, or large spotted winged gad fly, which produces the more common bot, whose figure is well known as somewhat barrel-shaped, with a thick annular skin beset with spines around the joints.—*Œstrus hemorrhoidalis*, with wings not spotted; the larvæ of which are whiter and smaller than the former.—*Œstrus veterinus* has also spotless wings, and produces oblong red bots, with smooth joints. The fourth, or *salutiferus*, is not yet clearly defined, but its speciality is marked by its inhabiting the pylorus. Linnæus supposed that the œstrus equi penetrated the nostrils *(Habitat in equorum fauce, per nares intrans.—Syst. Nat.)*, while the œstrus hemorrhoidalis he describes as entering the anus *(Mire per anum intrans.—ibid.)* Mr. Clark has, however, satisfactorily proved, that the parent fly of the œstrus equi deposits its ova on the hairs of such parts of the horse as are within the reach of his mouth and nose, as the shoulders, within the fore legs, &c.; to do which the fly is seen to hold her body upright when preparing an egg: she rests for a moment on the horse, and fixes it to the hair by means of a viscid gluten; after which she again rises, and prepares another, until some hundreds are so deposited. These ova, or egg bots, form the little yellow granules so commonly observed adhering to the hairs of horses at grass in the summer. The œstrus hemorrhoidalis, he informs us, deposits her eggs on the nose of the horse; while the methods of the veterinus and salutiferus are not at present understood. These ova having become hatched, are by various accidents, as by the horse's licking himself, or nabbing others, carried into the stomach, where they instinctively attach themselves to the cuticular portion, very few ever reaching the villous or sensible part, to which we must, in a great measure, attribute their innocuous character. To enable these animals to resist the effects of alimentary friction, they are furnished with two tentaculæ, or hooks, of extraordinary tenacity, between which is situated their mouth, by which they suck up the gastric secretions, as the mucus, but not, I believe, according to Mr. Clark, pure chyle, for chyle is not the product of that portion of the stomach, and it is even more probable that chyme alone is found in the stomach. Entering their abdominal habitation in the summer, the bots soon gain their full size, and continue within the horse until the following spring, when instinctively loosening their hold, they are passed along the intestinal canal, and ejected with the dung, preparatory to their change from larvæ into chrysalides, and from thence into parent flies.

Symptoms of worms.—The most popular is a dry yellow matter under the tail; but it is not invariably present even when worms are known to exist[*]. When worms are hurtful, in addition to this appearance, there is unequal appetite, and an irregular state of bowels; at one time costive, and at another loose, with glair or mucus around the dung-balls. When ascarides prevail, the horse is much disposed to rub the tail, to ease the itching of the fundament. The presence of bots is seldom detected by any distinct appearance, except in the spring, when one or more may be detected half protruded through the anus. The teres, or round worm, is probably the most generally hurtful, but this only when it exists in great numbers, or itself becomes morbidly irritated, to seek a change of situation, which will apply also to ascarides, in which cases both may interfere with digestion and the regular alvine discharges; by which the horse, although he may eat heartily, does not digest healthily. The skin also, sympathising with the stomach and intestines, occasions a staring coat and harsh feel of the hair. There are frequent attacks of slight gripes; the horse stands with his legs wide apart and his belly low. The breath is often hot and fœtid, and it is not unusual for a short dry cough to be present.

Treatment of worms.—Nature has endowed these animals with such tenaciousness of life, that few matters known to us will effect their destruction. Bots are so hardy as to survive immersion in oil, in alcohol, spirits of turpentine, and even powerful solutions of mineral acids. The continued use of salt mixed with the food appears, however, so obnoxious to them, as to make them quit their hold and become ejected. Bitters, purgatives, and the mechanical irritation of pointed bodies, as pewter, tin, &c. filed, have no effect whatever on bots: but with regard to the other vermiforms, rather more success may be expected from medical aid, in the form of vermifuges. It has been attempted to effect the removal of worms mechanically, by dissolving the mucus they are supposed to be imbedded in, for which lime-water, oil, solutions of aloes, tobacco, &c. have been injected by clyster up the rectum, and which practice is most to be depended on for the ejection of ascarides when in the rectum; strong purges are given with the same intent, which may remove them also from the whole alimentary track. Remedies have likewise been exhibited to destroy them within the body, by the mechanical irritation of their spiculi; under which view, filed tin, brass, iron, and pewter, are given. The *Cevadilla*, or Indian caustic barley, *Spigelia Marylandica*, or Indian pink, are reputed vermifuges against the teres and ascaris. The oil of turpentine has also been strongly recommended as an excellent general vermifuge; but, except for the destruction of the tænia, it certainly does not appear to deserve that character to the other varieties. The following formula may be tried with the double view of removing the worms and combating the effects produced by them:—

Submuriate of mercury (*calomel*)	eight grains
Powdered arsenic	eight grains
Pewter or tin, finely scraped	one ounce
Venice turpentine	half an ounce.

Mix into a ball, and give every morning fasting for a fortnight, unless it should prove too diuretic.

Of other worms and parasitic animals which are found in the horse, the *Filaria* may be noticed, from the peculiarity of its situation within the globe of the eye. (See *Diseases of the Eye.*) It has also been found in the cellular tissues, and within the cerebral, abdominal, and thoracic cavities. It has likewise been detected in the eye of the ox. A variety of the *Strongylus* has been found in the cœliac artery, and *Fasciolæ* have also been met with in the ileum. Hydatids likewise, though not very common, are also occasionally observed in the horse, presenting all the characters of the acephalocystes: and to their presence within the spinal canal we are to attribute some of his paralytic affections.

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[*] This yellow matter has been generally attributed to an excrementitious production of the worms themselves. Professor Peal, however, questions this, and attributes it to a morbid secretion from the rectum. Mr. Clark asserts, that out of three or four species of intestinal worms, this appearance is common only to one of them, the whip-worm; and that, in this instance, it originates neither from a morbid secretion of the rectum, nor from any excrementitious deposit of the worm, but is merely the soft structural parts of the animal itself, crushed by the anus in its passage through the sphincter. With all my respect for Mr. Clark's opinion on the subject of worms, I cannot agree with him on this point, for the trichocephalus equi is too rare a visitant to produce this very frequent appearance; neither will the most accurate examination of it yield any such matter.

PARASITIC ANIMALS IN CATTLE.

Of these I shall give a very condensed account. The *œstris bovis*, one of the gad-fly species, called by country persons *wornulls* or *wormuls*, punctures the skin of cows and calves, and deposits its eggs between that and the cellular membrane; the hatching of the larvæ matures the nidus, and the abscess formed thereby is called *puckeridge*, and is ignorantly attributed to a wound inflicted by the *caprimulgus*, goatsucker, or night hawk*. When arrived at their full size, the larvæ make their way out at the external opening, and fall on the ground. From the mischief which they do to the hides, their destruction should be attempted, which may be effected by introducing a hot wire, or by pressing the part. *Œstrus ovis* lays its eggs on the inner margin of the nose of *sheep*, which becoming larvæ, creep into the frontal and maxillary sinuses, occasioning great irritation. The continental shepherds trepan their sheep, and remove them; but our shepherds have not been successful with this method. Sheep are also obnoxious to a worm called the pallisade (*strongulus felona*), which seats itself within the trachea and bronchiæ. The *fasciola hepatica*, or fluke-worm, is also a parasitic insect, whose ravages are supposed to be most injurious. Horses, asses, and mules, are occasionally found with them also, as well as rats, mice, &c.; but in sheep, goats, and deer, it is very common, and is supposed to occasion fatal dropsies, and a tabid disease of all the abdominal viscera, the effects of which are thence called the *rot*. But what connexion the animal has with the disease is involved in much obscurity: certain it is, however, that both the disease and the animals are connected with a moist state of the pasturage, which, as being favourable to the production of animal life in some kinds, would lead to a supposition, that a particular parasite is thus generated, of such primary tenuity and hardihood as to resist the effects of digestion, and pass into the biliary vessels, where its presence may occasion the evil. Salt marshes never produce it; and salt is supposed a remedy also in the early stages. It seldom attacks sheep on high grounds; but having once received the infection, of whatever nature it may be, removal is then too late.

Hydatids, as producing what is known as *staggers* in sheep, are less common but sufficiently fatal. This vesicular animal, which intrudes itself into the cerebral cavities, produces effects which have received various provincial but characteristic names, being called by the French *tournis*, by the Welch *pendro*, by the English *gid*, *staggers*, *goggles*, *sturdy*, *turnsick*, &c. It is very universal throughout Europe, and, indeed, infests the flocks of most quarters of the globe. Hydatids also make their way, now and then, into the spinal canal, when they occasion paralysis†.

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* The naturalist will be able in this, as on many other occasions, to recognize the origin of many vulgar names of our animals. The aerial swoops made by these birds in pursuit of their favourite food, the scarabeus or beetle, as they are very often made immediately around cattle, might readily be mistaken by country persons for personal attacks on them. Certain it is, also, that the monstrous mouth of the caprimulgus is far better adapted to *suck goats*, than the pointed porcine mouth of the hedgehog is to embrace within its tiny expanse the monstrous nipple of the cow.

† The vitality of the *tænius globulrus* or *cœnurus cerebralis* is fully evinced on being put into water, which, if it be warm, excites lively motions in the animal, whose size varies from that of a pigeon's egg to the minutest vesicle. How tæniæ insinuate themselves within the head is unknown; but they are found sometimes solitary, and at others two or three are placed together within the ventricles of the brain; occasionally within the substance of the cerebellum, but more frequently immediately on the surface of one cerebral hemisphere: and it is said they are more common to the right ventricle than to the left; and that its effects are generally produced on the opposite side to that on which the parasitic animal is placed; and it is usual to find the hydatid on that side of the head towards which the sheep inclines in his revolutionary gait. When the disease has existed some time, the ravages it occasions are very great: one of the cerebral lobes has been found almost destroyed: one of the ventricles has been distended to ten times its original magnititude: while in other instances, one of the parietal bones has become so absorbed by the pressure of the hydatid, when situated on the cerebral surface, as scarcely to offer the smallest resistance to the touch. It is more frequent in sheep

COSTIVENESS.

SOME horses are habitually costive, which arises either from a defective secretion of the fluid of the bowels; or, that the absorbents act too strongly, and take up too much of the liquid contents, by which the fæcal mass becomes dry, hard, and difficult to pass; or it may, and frequently does, arise from a defect in the formation of the bile, either as to quantity or quality. This we know from what occurs in jaundice, in which, from a loss of the bile by extravasation, there is always present a strong disposition to a costive habit. Some food is prone to occasion constipation, as whatever is stimulant and heating. Corn of all kinds, therefore, has this tendency, but beans more than all. *Habitual costiveness* should not be counteracted by purgatives, as they generally increase the evil; but attention should be paid to the habit itself, and the peculiar tendencies of that should be counteracted. Dry food should be remedied by occasional bran mashes. Green meat is particularly useful in these cases in summer, and carrots in winter. When costiveness arises from defective bile, treat as directed under Jaundice.

Occasional or *accidental costiveness* must be treated differently. First, backrake, next throw up a laxative clyster (see *Clysters*, *Mat. Med.*); and then proceed to give a purgative by the mouth, milder or stronger according to circumstances.—See *Purges* and *Laxatives*, *Mat. Med.*

DIARRHŒA, OR LOOSENESS.

THIS complaint is properly an increased action of the peristaltic motion of the intestines, with a greater secretion of a watery fluid within the intestines; or, otherwise it may arise from a want of a proper absorption of the fluid part of the intestinal contents; whereby there follows a frequent evacuation of the dung in a very liquid form. It is distinguished from dysentery by the purging being complete from the very first; by its being more copious, having all the fæces in solution without a glairy mucous matter, erroneously considered as the fat of the body; and, also, by being seldom accompanied with fever, or any great affection of the general health, unless it be long continued. Some horses are very liable to purging on every exertion, and such are termed, by grooms, *washy*, having usually narrow chests and lank bellies, by which the intestines have not sufficient room for their natural processes, but are pressed on, and thus forced to a hasty expulsion of the unassimilated contents.

Causes.—Diarrhœa may arise from mechanical pressure, resulting from the form; and thus a light belly is often found with it; or it may arise from a constitutional debility in the intestines themselves. A weakened state of the bowels, inclining to this affection, is often brought on by drastic purges likewise. But besides these, there arises a more active and serious affection dependent on

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under two years old than at a later period; and is known by the staggering gait of the affected animal, and its separation from the rest of the flock; the head is held unnaturally low or high, and is carried more to one side than the other, inclining also the general movements of the body to the same side. As the pressure of the hydatid increases, the functions become still more deranged: the sheep staggers about almost unconscious, with dilated pupils, and loss of cud; until coma or convulsions close the scene. Of the *cure* I would remark, that, notwithstanding the hopes held out, it is not often obtained; for the situation of the hydatid is so diversified and so obscure, that it is only when it directly points itself out by its effects on the cerebral parietes, that we are able to detect it with any degree of certainty. In such cases it may be attempted to puncture the vesicle by means of any instrument that will penetrate the bone with safety, after a slight opening has been made through the integuments by a scalpel. A rude, but by no means an ineligible instrument, is a fine sharp gimlet, which will effect a sufficient opening if passed as far as its screw, or until the hydatid fluid flows, and will prove effective, by evacuating the vesicle without danger of wounding the brain. After the operation, in whatever way performed, should the symptoms not mitigate, there will be reason to suspect that a second or third hydatid remains, in which case the trephine must be resorted to. After the operation, stitch up the integuments, and secure the head from the effects of cold, violence, or insects. Continental shepherds attempt a rude cure by introducing a long pointed instrument up the nose, through the frontal sinuses, and into the cerebral cavity, by which means the hydatid is effectually destroyed; and ill consequences less frequently result than would be supposed from such treatment. As a *prevention*, the Marquis of St. Fere disengages oxygen gas into his sheep-sheds, and he thinks with great success.

some morbid change taking place in the secretions of the stomach and bowels, making them a source of irritation to the organs themselves. The *bile* occasionally takes on such a change, and worms are another cause in some habits. The food itself likewise becomes, at times, improperly assimilated, and enters into new combinations with the gastric juice, whereby an acrid matter is formed: this matter has been supposed to be an acid, and hence absorbent earths have been much used in this complaint. Horses moving from hay to grass, or even from grass to hay, become affected with looseness; for the stomach and bowels prove unequal to the office of assimilating a new food at once, and hence they are irritated to an early expulsion of their contents, as a matter foreign and incapable of perfect assimilation.

It may also be occasioned by the sudden application of cold, whereby the exhalent arteries of the skin becoming checked, more fluid is necessarily thrown on the intestines; and which operates not only by increasing their quantity, but likewise by the addition of something foreign, and hence irritating to them. In these cases, which are marked with thirst and increased pulse, the restoration of the healthy action of the skin is necessary to a cure; and as the balance of power *has been* in favour of the intestines, it would be desirable *now* to turn it in favour of the skin, by making use of the few horse diaphoretics we know of, as *antimony*, *warm clothing*, &c. &c.; and by avoiding the use of active astringents.

The *treatment*, in general cases, is simple, and requires little more than warmth and a change of diet. If constitutional, we must palliate by a mild but constant check on the existing causes: a light-bellied horse should not be worked several days together severely; avoid too much water, or too early work immediately after meals. Let the purgings be examined: if the food passes away undigested, the stomach is at fault (see *Tonics*); but if it be a more recent attack, examine well the probable cause. Has it followed any undue exposure, any violent exertion, any change of food, any great difference in the warmth of standing? Is the water good in quality; are the oats, or is the hay new? If none of these causes operate, we must first make ourselves aware that it is the fæcal discharge which passes, for such appearances have concealed an obstinate constipation. Being convinced of the diarrhœa, commence the cure by mild astringents. It sometimes happens, when diarrhœa has been long continued, it seems to pervade the whole alimentary track, so that, at the last, the cæcum and rectum become equally affected, and then a distressing tenesmus prevails. In these cases it will be often in vain to give astringents by the mouth, which become themselves irritants, or so changed in their passage as to reach these latter bowels almost inert: here astringent injections will frequently effect all we wish. Commence, however, the cure of the general cases of diarrhœa by giving the following drink once or twice a-day, according to the violence of the complaint:—

Prepared opium	half a drachm
Powdered catechu	two drachms
Prepared chalk	two ounces
Sulphate of iron (*green vitriol*)	half a drachm
Starch, boiled thin	a pint.

Mix.

In very obstinate looseness, half a drachm of *alum* may be added, and the quantity of opium doubled; and in such case, and also whenever the affection has been long continued, once or twice a-day give the following clyster:—

Boil six poppy heads in four quarts of water to two, add to the liquor

Prepared chalk..	two ounces
Boiled starch	two quarts.

Mix.

To this also, if necessary, alum may be added; and should the horse be weak, boiled starch, or arrow-root, or boiled bean meal, may be horned down the throat frequently. Give no cold water to drink, but, instead, give thin gruel or rice-water, tepid. Clothe warmly, encourage a warm temperature also, and carefully avoid exposure to sudden currents of cold air. I have known green meat check diarrhœa which had resisted every other attempt. To the more intimately understanding of this complaint, under its several varieties, see the subject of Dysentery.

Diarrhœa in Cattle.

Cattle Looseness, *Scouring Cow*, *Scantering*, *Scouring Rot*, are, all of them, terms used by cowleeches and persons about oxen and cows, to express diarrhœa, or alvine flux, which is much more frequent in kine than horses, and also more obstinate and fatal. To a proper treatment of this complaint, it is necessary to consider it in a different point of view to what it has been generally regarded. There are, in fact, *three kinds of scouring* in cattle. A *dysenteric* (already considered), having an inflammatory origin; an *acute* diarrhœa; and, a chronic or slow. The *acute* is occasioned by intemperate and long-continued travel in hot weather, or by cold supervening on heat, cold and wet, lying out, &c. &c. There is almost a constant fæcal discharge of slimy, frothy matter, with half-digested aliments intermixed; with a pulse usually increased in frequency. Remove at once into a shed; and if the eyes are blood-shot, the breath hot, but the extremities cold, with heaving, bleed moderately, and give the following:—

Sulphate of soda (*Glauber salts*)	two ounces
Sulphate of magnesia (*Epsom salts*)	two ounces
Powdered ipecacuanha	half a drachm
Sulphate of iron (*green vitriol*)	six grains.

Chronic diarrhœa in cattle differs from the acute in origin, appearance, and in the obstinacy that usually characterises it. It may arise from any thing tending to reduce the animal beyond a certain limit, as low unhealthy keeping, &c. Cattle having been driven long distances, if fat, become affected with dysentery; but if lean, and low in condition, take on the *scouring rot.* Cows suffered to suckle two calves, or not sufficiently fed when long milked, are liable to it; and now and then it follows exposure to bad weather, particularly in impoverished animals. Bad food is also a common cause of it. The symptoms of this more slow continued kind are, a frequent stooling of liquid matter: the appetite is seldom much impaired at first; sometimes, on the contrary, it is increased. The evacuations are much darker and more fœtid than in the former kind, and as they drop away, a lighter yellow fluid follows, leaving a frothy head to the fæcal mass. The animal loses flesh, the eyes look yellow and are sunk, and the graziers affect to tell the existence of the complaint by the tenderness of the beast across the loins. These cases, after death, usually present marks of chronic visceral affection; but more particularly the liver is often affected, as it were, with chronic hepatitis; to which, I believe, we may ascribe most of these cases, as well as the obstinacy which marks their progress.

The *treatment* of this kind of scantering, or rot, is complex, for the purging is dependent on morbid bilious secretion, to check which, first try the following:—

Calomel	half a drachm
Alum	a drachm
Powdered gentian	two drachms
Powdered opium	five grains
Decoction of chamomile	a pint.

Give every morning. If by the second or third day amendment is not commenced, proceed to cut the hair from the belly, principally from the right side, beginning at the navel, cutting forward, around and upwards, towards the sides, making a surface of fourteen or fifteen inches in diameter. Rub into this, every day, half an ounce of strong mercurial ointment, and every morning give the following, instead of the former:—

Green vitriol	half a drachm
Powdered opium	half a drachm
Powdered gentian	one ounce
Boiled starch	one pint.

Feed liberally, and give bean meal in a mash or otherwise: and, if symptoms of salivation appear, omit the mercury, but continue the drink. I have used the prepared rust of iron, half an ounce in a ball, with advantage in these cases: but the benefit of the mercurial course is apparent in every instance of hepatic disease, and it is but very few of these cases which have not their origin in biliary affection.

SCOURING IN CALVES.

From a morbid stomach secretion, calves are very prone to diarrhœa: to remedy which, graziers give them chalk to lick. When looseness has appeared, they also give chalk in milk: others give suet boiled in milk, which is a good domestic remedy, as well as starch or bean flour boiled in their food. But when these fail, give the following, which is almost certain in its good effects:—

Prepared chalk	half an ounce
Powdered opium	five grains
Powdered alum	ditto
Suet and milk, boiled	half a pint.

Sheep are subject to both the acute and chronic scouring: and *Lambs* are also liable to a similar looseness with calves. In either case, the rules already laid down exactly apply, making one-third of the quantities of the remedies of the exhibiting dose.

CRIBBITING.

THIS peculiar action is very generally, but, in my opinion, erroneously, supposed to arise from a small quantity of air drawn into the stomach: and is hence called *sucking the wind*. But, I believe this idea of it to be very incorrect: and that, on the contrary, it consists in the simple eructation or forcing out of a small quantity of gas, let loose from morbid combinations within the stomach, which, as it proves a source of irritation, to aid its expulsion, the horse applies his teeth to a fixed point, by which he gains the help of some of the muscles of the fauces to open and straighten the œsophagus, while, at the same time, by means of the abdominal muscles, he presses on the stomach, and forces out a little of the irritating air. To prevent the action, it is common to place a tight strap around the throat, which prevents the horse from attempting the dilatation of the pharynx. Exactly the same process takes place in ourselves, except that we have no occasion, from the peculiar shape of our pharyngeal opening, to gain a fixed point for the teeth; but, in every other respect, human eructation in dyspepsia is conducted in the same manner.

It is considered a vice, a habit acquired, &c.; but I believe that it always commences in dyspepsia, the consequence of long living on dry food, &c. I never knew an instance of its being contracted at grass; but turning out to indifferent keep in a straw-yard is a very common cause. It may be traced to a course of chaff feeding, bad hay, musty oats, and long confinement during frosts. Cribbiters rarely carry much flesh; but it can never be supposed that the mere action of cribbiting, were it either a vice or an amusement, could deprive them of flesh. The faulty digestion at once keeps them thin, and makes them prone to assume this dyspeptic symptom, which, once acquired, is lasting from habit, even although we could remove the original cause. Under this view, we recommend that the habit be attended to only as far as regards the consequences which are likely to ensue from the wear of his teeth; to say nothing of mangers, &c. To suppose that the stopping of the action will do more, is fallacious; for however we may succeed in this, the horse remains as he was in flesh. To prevent the cribbiting, nothing more is necessary than to place a strap of two and a half inches broad around the throat, tightened only to the degree necessary to prevent the action, which it does by rendering it painful to distend and straighten the pharynx, confining the auxiliary muscles. A very ingenious collar-machine is now made, the invention of Mr. Yare, which, I am informed, effectually prevents cribbiting. and does him great credit: it is far superior to the former methods. Mr. Stewart also describes an apparatus to prevent cribbiting.

MORBID DISPLACEMENTS OF THE INTESTINES, &c.

INTESTINAL HERNIÆ.

Hernia, in its strict sense, is a protrusion of any viscus whatever out of its natural cavity; hence we have hernia of the brain, of the lungs, and of the various viscera of the abdominal cavity. Many of these our confined knowledge has not yet made us familiar with; and if we take human pathology as our guide, there are others which structural peculiarities prevent the appearance of[*]. Hernia, as we propose to consider it, is a displacement of the intestines from the abdominal cavity, either through some of the natural openings or through artificial ones, the effect of accident[†]. When such protrusion takes place through a moderate opening, and the portion of gut can be readily returned, it is called a *reducible* hernia; but when it occurs through a small opening, and cannot be replaced, it is *irreducible*. If the mouth of the sac around the intestine constringe, and produce inflammation of the gut, it then forms a *strangulated* hernia, and usually proves fatal, unless relief be promptly obtained. I here beg to observe, that for the more complete illustration of what is to follow, I would refer the student to the anatomy of the abdominal ring and inguinal canal, as detailed at p. 248. The hernia by far the most common in the horse is the *inguinal*, of which *oscheocele*, or scrotal, is most frequently observed in the stallion, and *bubonocele*, or that of the groin, in the gelding[‡]. In the former, the intestine accompanies the spermatic rope by the inguinal canal through the abdominal ring into the scrotum: in the latter it lodges in the groin. Epiplocele is very rare, from the confined limits of that organ, and is never hurtful; but it is erroneous to think it impossible; at least, we are informed by M. Girard that it is not unknown. *Enterocele* may, therefore, be considered as the principal hernia to which the horse is liable. It is very rarely seen on both sides; but, according to M. Girard, it is more frequently on the right than on the left side; and scarcely ever appears in mares[*].

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[*] M. Girard, in his elaborate *Treatise on Inguinal Herniæ in the Horse, &c.*, to whom the veterinary world are indebted for a series of systematic instruction on this subject, observes, 'The resistance offered from the density and peculiar disposition of the muscular parietes of the splanchnic cavity, explains why inguinal herniæ are so unfrequent in monodactyles, and why other herniæ, such as crural, opturator, and pubic, are unknown.

[†] I have frequently seen hernial tumours the consequence of a violent push or goad made with a blunt instrument, as the knobbed or armed horn of a vicious, cow, &c. Mention is also made by Mr. Percivall of a horse at the Veterinary College, shewn to him by Mr. Sewell, with a hernia, the size of a small apple, behind the cartilages of the false ribs, between the fibres of the internal oblique and transverse muscles. Remarkable as it is, I well remember, when I resided at the College also, and occupied the same situation, lately so much more ably filled by Mr. Sewell, that one of the first cases brought there for examination was exactly of a similar kind in cause, size, and situation, and which resisted all the efforts of M. St. Bel and myself for a long time to restrain within its limits; until we had a firm leathern pad made, which being girthed round with webbing, produced such pressure as completely detained it within the abdominal cavity.

[‡] On the European continent, throughout Arabia and India also, hernia is very common, from the custom of using *entire* horses; whereas in the British isles, where castration is so common, the inguinal canal is too much narrowed by the operation to make it a frequent occurrence with us; and when it does take place, the intestine cannot, in general cases, pass beyond the groin, from the contractions of the parts and the adhesions formed. That displacement of some parts through the narrow openings natural to the cavities, and the actual rupture of other boundaries, do occur, we cannot wonder at; on the contrary, when we consider the force of the exertions made by the horse in our service, we are only surprised that they are not more frequent. We are apt to conceive that, in England, our method of shutting up the abdominal opening saves us many horses; but I am of opinion this freedom from hernia, not always a fatal complaint, is gained at the expense of ruptured diaphragms, which are always fatal. I therefore believe, that here we have more frequently diaphragmatic lesion; and in India, France, &c. hernial protrusion is most prevalent.

The *causes* which produce herniæ are various, but all arise from violences offered to the abdominal walls. With us the efforts used in racing, and the leaps taken in hunting, are causes, as we may readily suppose, when we consider that the dilatation of the abdomen, restrained as it is by weight and tight girthings, must press backwards the intestinal mass. Rearing and kicking also, and the being cast for operations, particularly the rising up after castration, have all brought it out[†].

The *symptoms* of strangulated hernia are very similar to those of an acute enteritis: there are the same uneasiness, shifting of position, getting up and lying down again. The horse rolls in the same manner, and in turning on his back, sometimes seems to get a momentary respite from pain; yet it is but momentary, for the suffering is not one of remission, it is constant, which will serve as one distinguishing mark between it and spasmodic colic, with which it has been confounded. In stallions, a pathognomonic symptom is, that the testicle on the hernial side is drawn up to the abdomen, and is retained there, with only momentary fits of relaxation; towards the last the pulse is quick and wiry; the horse paws, looks at his flanks, but seldom kicks at his belly. We assure ourselves of hernia by an oblong tumour in the groin, of larger or smaller bulk; hard or soft, as it may contain either fæces or gas, in which latter case it will be elastic. When the tumour is raised by the hand, or pressed, a gurgling sound is emitted; or if the horse be coughed, whether it be gaseous or stercoral, it will be sensibly increased in dimensions.

The *treatment of strangulated hernia.* As we derive our best precedents and instructions on this subject from Indian and continental practitioners and writers, we will follow in their track, and first consider our hernial patient as in his *entire* state, and describe the various manipulations for his relief in the following order: first, the examination of the state of the hernial sac; secondly, the application of means preparatory to the taxis; thirdly, the taxis itself; fourthly, the operation of dilating the stricture; and, fifthly, the application of these various processes to strangulated hernia in the gelding. What I have to offer on these various points will be drawn principally from the above sources; where the practice is as common, and the subject as familiar, as it is rare among us.

The treatment of hernia in a stallion.—First, *the examination of the hernial sac:* on this subject M. Girard directs as below[‡]. But although it may be attempted to examine into the actual existence and state of hernia while the horse remains standing, yet as there may be a necessity, in some cases, to cast him for the purpose, it will be well to commence the treatment by a very full bleeding, to the amount of eight or ten quarts, which will relax all the parts, and prevent so much muscular resistance as might otherwise be experienced. Secondly, the *application of means preparatory to the taxis:* these are the bleeding, already mentioned; partially paralysing the parts by injections of tobacco; or lessening the volume of distention by dashing with cold water; or, if the horse be already cast, by spreading ice over the belly, as I have myself practised on the human patient with great success. Thirdly, the *taxis;* or *manual efforts to return the displaced gut.* To fulfil this indication, we are, from the same source, directed to proceed thus[*]. If the taxis should be fortunate enough to reduce the hernia, and it be not intended to castrate the horse[†], apply a well-wadded pledget, or folded cloth, to the part, which may be retained with a bandage crossed between the legs from side to side, and fastened by one part under the belly to a girth; and also passing between the legs, it may be again made fast to the back portion of the same girth; the intention of which is, to prevent the protrusion of the gut by the exertion of rising, and consequently it should be removed as soon as that danger is over. If a radical cure were attempted, of course the clams would supersede this, either in the stallion or gelding. Being turned on the opposite side to the affected one, the horse should be allowed to lie as long as he chooses, the straw on that side being removed, and the hobbles unbuckled, which, if gently done, and the horse caressed while doing, will not disturb him. His after-treatment must be for some time of the mildest kind: for a week, hay and bran mashes alone should be his food, during which he should be kept perfectly quiet; but afterwards he may be gently walked out during his confinement: watch the pulse and the state of the bowels, that we may be ready to obviate inflammation by the lancet, &c., and costiveness, by mild laxatives. It would be well, to prevent the exertion of lying down and rising up, to tie the horse up to the manger until the parts have somewhat re-established themselves. Fourthly, the *operation of dilating the stricture in strangulated enterocele.* The means already detailed having failed, it remains that we proceed further; to effect which, we shall again call our guide, the Professor of Alfort, to our assistance[‡], which being concluded according to methods detailed below, brings us to the *treatment of strangulated herniæ in geldings*, involving our fifth consideration; on which M. Girard observes, ‘ Inguinal hernia takes the same course, is susceptible of the same terminations, and requires the same treatment, as in stonehorses. The taxis is to be employed, and will be done so with most effect by the operator (the horse lying upon his back) extending the hernial sheath with one hand, while he manipulates with the other; or, should this fail, by instructing his assistant to hold up the hernial mass from the belly, so as to take its pressure off the ring, and thus give him an opportunity to renew his efforts with more effect. In some cases, the introduction of one hand into the rectum becomes necessary. The reduction of the hernia should be followed up immediately by the application of the clams, if we unite with the reduction an attempt at permanent cure of the hernia: taking care, at the time, to draw out the part of the scrotum to which the vaginal sheath is adherent, and to push up the clams as close as possible to the belly; which are then to be closed, as for castration. Should the enterocele prove irreducible, we must proceed to open the sac, and having, with the finger, ascertained the nature of the stricture, set about releasing the gut by incision, according to the rules of practice for recent strangulated hernia. After reduction, the clams are to be applied upon the cord, with the precaution, that the opening made in the sac be included.’ If we contemplate only the relieving the horse from the effects of present strangulation, we close the wound by the suture; and after all the cautions detailed with the operation for the relief of recent strangulation in the stallion, we allow the animal to rise. We would recommend the student who wishes for more extended instruction on the subject of herniæ to apply to the work of Girard, as well as to some valuable communications from India, to be met with in various numbers of *The Veterinarian*; more particularly we would recommend the student to a most able and descriptive account of the *operation for recent strangulated enterocele in The Veterinarian*, vol. ii, p. 30.—Of that most distressing event, the hernia of castration, I shall have something to say when I describe that operation.

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[*] An ingenious translator and commentator on Girard's Treatise remarks, on this assertion, "That its preference for the right side is probably owing to the habit of horses making their preparatory efforts to progression by the extremities of the right side; i. e. they usually lead with the right. Its rarity in mares is dependent, in all probability, both on the diminished size of the inguinal canal, and the elevation of the pelvis.

[†] M. Girard notices, as one cause of hernia, the colics of horses. We cannot see the connexion, further than that the rolling and plunging in these cases, which probably may influence its production in the stallion; but we are not accustomed to observe it as a cause here. I would also observe, that our want of much experience in this complaint may very probably make us pass over many cases of hernia, which we attribute to enteritis, colics, &c. &c; but in this instance, the hernial symptoms would not come on immediately; and the intervening time would probably be marked by a remission of such symptoms, as the strangulation would be also marked by a train of somewhat new ones, in which the pulse would be thready, and the pain constant, and at first would be probably without spasmodic acuteness.

[‡] In this manipulation, which can leave no doubt about the presence of bubonocele, both hands are employed; one is introduced into the rectum, the other into the sheath. The one within the rectum must seek the internal ring; while the other, pursuing the course of the chord on the side affected, is to be pushed up to the external ring; and thus, in the natural state, the opposed fingers may be made nearly to meet, and so estimate the size of the opening. However small the protruded portion of gut, the practitioner will be able to detect the bubonocele, and even to reduce it, by proceeding *secundum artem*, and taking the necessary precautions, to be hereafter pointed out. *This exploration may be made in the standing posture; but it will be conducted with more facility and certainty if the animal be cast, which is the preferable mode of proceeding.*

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[*] The horse is to be thrown upon the opposite side to that disordered; and after one hind leg has been drawn and fixed forward, as for castration, he is to be turned upon his back, and in that position maintained by trusses of straw, while other trusses are placed under him to raise the croup. With both arms well oiled, or covered with some mucilaginous decoction, the operator will now commence his exploration, taking the precaution of emptying the rectum as he proceeds. As soon as he shall have ascertained that it is a case of hernia, and assured himself that the gut protruded through the ring is undergoing neither stricture nor strangulation, he may endeavour to disengage the hernial part, by softly drawing it inward within the cavity, at the same time pushing it in the like direction with the hand within the sheath. Should he experience much difficulty in these attempts, he is to desist, violence being too often the forerunner of strangulation and gangrene. He must bear in mind, also, that although the reduction is effected, unless it be followed by immediate castration, it does not always prove to be a cure for bubonocele: the protrusion recurs after a time, and occasionally even the moment the animal has risen.

[†] The castration of the horse is intended to render the operation more effective, by preventing the liability of its *immediate* recurrence when rising up, or any efforts that may be made; and equally also to prevent its *future* recurrence. This, which forms the radical cure of hernia, is much practised in France, but less so in India. We are, however, to remember, that in the performance of it we add other chances to the tendency already excited to peritonitis and enteritis; were it not for this, every case of hernia should be accompanied by castration. The special precautions given by M. Girard in this case, of accompanying castration, are, 'that, in cutting through the scrotum and dartos, the hernial sac be not opened; at the same time, that the separation of the sac from the dartos be as complete as possible, to give the utmost effect to the clams, *which should be fixed close to the ring*. It need not be added, how imperative it is that no intestine be included between the cheeks of the clam.

[‡] The animal being cast upon his back, there will arise many advantages if we can manage to pass the hobble-rope, coming from the hind leg of the hernial side, over a beam or through a ring, whereby we may have the power of extending it at pleasure, and abducting it from the opposite limb. Every thing ready, and the assistants properly posted, the operator retaining the most handy of them in attendance on him, he will extend an incision, begun about opposite to the external ring, down along the middle of the anterior surface of the cord, for the space of two or three inches; at the same time, provided there be no intestine actually within the scrotum, the testicle may be drawn out. The skin being thus divided, the operator will next carefully cut through the dartos, by which he will expose the vaginal tunic, now the hernial sac, which is recognized at once by its dense albugineous texture. The most scrupulous nicety is required in opening the sac to guard against wounding the gut, and especially when the parts are much distended. The best mode of proceeding is, first, with the middle of the blade, to scrape through some of the exterior fibres, and afterwards, with the forceps, dissect up, layer by layer, until we arrive at the innermost serous layer, immediately enveloping the gut; into this a hole is to be made only large enough to admit the director, by the aid of which, either with

Of *congenital hernia*, my limits allow of little more than the mention; nor need more be detailed, as its consequences are seldom injurious. It appears that inguinal hernia commonly exists in the fœtus in utero. M. Lineguard, V. S., of Normandy, where breeding is very extensively pursued, has ascertained that

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a bistoury or the scissors, the opening is to be sufficiently dilated. The incarcerated intestine, evolving under the knife, is now to be drawn out of the sac, and maintained extended by the pressure of a linen cloth moistened with some simple mucilaginous liquid, in order to facilitate getting at the stricture. The operator is now to pass one or two fingers into the hernial sac, and carry them onward to the seat of the stricture, against which he must keep them steadily maintained, so that they may serve as a director to a probe-pointed bistoury, which is to be passed flatwise along them, with its edge turned outwards, and thus insinuated within the stricture. Being certain that the bistoury has passed the neck of the hernia, he has nothing further to do than to turn its edge forwards, still keeping it inclined outwards; and immediately he finds the stricture divided, the liberated gut slips back into the belly, either all at once or by degrees. Some cases will be found to require an extension of the incision, or some further division of the stricture: much discretion, however, is requisite in these secondary cuts, inasmuch as the return of the hernia is always to be less apprehended after *small* incisions. Should the gut not spontaneously recede, a little dexterous manipulation may accomplish its return: it will never be required, however, to pass the hand into the rectum. The bowel having returned, the propriety of castration will be decided on by the state of the cord, epididymis, and testicle. Should they be ingorged, livid, and marked with purple spots, the operation becomes indispensable; because it may, performed in time, prove a preventive of congestion, peritonitis, and gangrene It is to be practised only on the side affected, and in the ordinary manner, with the clams *a testicule couvert*. Under other circumstances, although the parts may evince compression, still, so long as there are no signs of mortification, castration is not called for. Whenever the testicle is not removed, the opening in the scrotum is to be closed by suture: and it commonly happens afterwards that adhesion takes place between the testicle and its vaginal tunic. It must be a caution to the practitioner not to enlarge the strictured opening beyond what is actually requisite for the return of the gut; for it has happened, from want of due caution in this particular, that the intestines have appeared anew, and been followed by fresh protrusions, until they have reached the ground. This terrible evil has happened also from the struggles of the animal at the moment: the best preventive to which is, the use of the *concealed bistoury*, whose sections are regulated by a screw. See Mr. Molyneux's account, *Veterinarian*, vol. ii. The operation finished, the horse should be made to remain prostrate as long as it can be done without great fatigue and irritation to him, which will greatly depend on his natural temper, and the means made use of to soothe him. The limb which was drawn up to the beam may be relaxed, and his body allowed to incline to the opposite side to that operated on, which will greatly lessen fatigue and irritation. The greatest caution, as already hinted, will be required *when he does rise*, that he be encouraged to do it without hurry or unnecessary effort. His future treatment must accord with the views already detailed.

enterocele is invariably present at birth; even in abortions, and in subjects still born. The *congenital enterocele*, M. Girard says, is an attendant on birth, increasing up to the third or sixth month*, but afterwards diminishing, and ultimately vanishing. Should it continue beyond a year or eighteen months, it is to be regarded as a chronic or permanent hernia. *Chronic* or *permanent hernia*, it may be remarked, forms a very prominent feature in M. Girard's treatise; but as regards the importance of chronic enterocele, our observations being so much limited to geldings, we see little of it, and consequently know little of it. It is evident, that neither in the case of its appearing, either here or in a stallion, would it be prudent to resort to any operation for the removal of it, unless that it either became strangulated; or otherwise that, by frequent colics, &c. it rendered the horse (perhaps a valuable one) useless to the owner, and burthensome to himself.

MORBID DISPLACEMENTS OF THE INTESTINES AMONG THEMSELVES.

The intestines, in consequence of their peristaltic motion, become sometimes entangled together, and a fatal strangulation takes place; it also happens, occasionally, from some of the mesenteric folds entwining them: but it is much oftener the consequence of *spasmodic* action during colics that these *inversions, involutions, invaginations*, and *intussusceptions* occur. When thus affected, it is not unusual for the ileum to become reversed in its peristaltic motion, in which case a posterior portion, then contracted by spasm, becomes forced into an anterior portion less constringed, and an impenetrable obstruction is thence formed. An ignorant pretender may then taunt the best practitioner with not being able to cure a disease of every-day occurrence, and which every ignoramus has a boasted specific for. We may draw a practical inference from this and such like cases—that in spasm we should attempt an early relief; and likewise that we should endeavour, in all cases of failure in bowel affections, invariably to make a *post-mortem examination:* and this we may do on two grounds—repeated cases may afford us pathognomonic symptoms, and then, although we cannot relieve, we may offer a prognosis, which will convince our employers it is not our ignorance of the case, but our confined means of treatment within important cavities. It may also happen, that by becoming more intimately acquainted with the symptoms peculiar to these displacements, we may hereafter attempt, by introducing the hand, to mechanically free them. Would the introduction of a quantity of quicksilver, in that spasmodic constriction of the ileum known in the human as the *iliac passion*, and which old practice has been lately revived, have any effect in the iliac spasmodic colic of the horse? or would it fail, from the horizontal position of the intestines here? It would certainly promise more than the introduction of an eel, to thread the intestinal mazes, as has been done.

CLASS VI.

DISEASES OF THE GLANDS.

JAUNDICE.

ICTERUS, by farriers called *the yellows*, as a distinct affection, is unfrequent in the horse, from his hepatic system yielding only hepatic but no cystic bile. As a symptomatic affection, it is, however, more frequent; for whenever any great abdominal inflammations occur, the liver is very liable to participate; bile then passes into the bloodvessels, and from thence is thrown on the skin. Occasionally also a more slow and primary affection of this organ occurs, and the biliary secretion appears either increased in quantity, altered in quality, or obstructed; and the consequence is, that the evacuations are irregular either in quantity or quality. This state is *betokened* by listlessness, dyspepsia, irregular appetite, and early fatigue under exercise: there is some biliary suffusion in the membranes of the eyes, nose, and mouth.

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* Hurtrel d'Arboval observes, 'On ne pourrait pas expliquer aussi pourquoi l'on ne rencontre jamais de hernies crurales dans le fœtus de la jument, tandis qu il n'est pas rare d'y trouver des hernies inguinales, ombilicales,' &c. In the *Recucil de Méd. Vét.* 1828, it says, 'These swellings occasionally appear in the scrotum of the colt a few days after the birth. Sometimes they occupy one side only of the bag; occasionally both are distended. In a few instances, the scrotum becomes as large as a child's head These are true scrotal herniæ. A portion of the intestine descends into the scrotum. Bandages and topical applications are perfectly useless, or produce irritation and pain. At an uncertain period, the swelling begins spontaneously to diminish, and at length entirely disappears. Where it has occupied both sides of the scrotum, it is more slowly reduced; and the reduction of one side seems to be perfectly independent of the other.

In our *treatment* of such a case, we must attempt to produce a healthy action in the liver, or we must remove its obstruction. To promote these intentions (as in the greater number of cases costiveness is present), begin by giving the following:—

No. 1.—Calomel (*submuriate of quicksilver*)	one drachm
Aloes	two drachms
Powdered gentian	ditto
Castile soap	ditto.

Form into a ball, and give night and morning until the bowels are actively purged; and then continue only so much of the same, for a week or ten days, as will keep them lax, but not in a purging state. If the symptoms be such as bespeak chronic inflammation or incipient hepatization, bleed, and blister the sides: a rowel also in the belly may be applied. In cases where costiveness is not present, but, on the contrary, a relaxed state of the bowels appears, give the following, which is also proper as a tonic for the *latter* stages of the former kind of affection:—

No. 2.—Submuriate of quicksilver (*calomel*)	twelve grains
Sulphate of copper (*blue vitriol*)	one drachm
Gentian, in powder	three drachms
Oak bark, ditto	ditto
Chamomile, ditto	ditto.

Make into a ball, and give night and morning, unless the calomel should affect the mouth, in which case give only one a-day; and should the looseness increase on this plan, add powdered opium, half a drachm to each ball. In all cases of *yellows*, a change of food is proper, and generally necessary. In winter, spear the corn, or give carrots; in summer, soil, or turn out to grass; but, in such case, avoid exposure to the night air, and make use of moderate clothing so long as the calomel is continued.

Jaundice in Oxen and Sheep.

These animals having a gall-bladder and cystic duct, are more liable to biliary *obstructions* than horses, and hence this complaint is more frequent among them. It is very common in some of the cold provinces on the Continent, where these animals are stall-fed in winter; from which, numbers of them are attacked with it in the spring. The cure is promoted, in these cases, by turning them into grass lands. In England, it is less often the consequence of confinement than of a slow inflammation of the liver. In such instances, therefore, treat exactly as detailed under this head in horses, regarding, at the same time, the strength and size of the beast.

INFLAMMATION OF THE SPLEEN.

I never met with this disease in my own practice, but I have lately heard of a very well-authenticated one, in which the symptoms so exactly resembled hepatitis, as to be mistaken by a very observant practitioner for that. An active and judicious treatment was promptly pursued, but the violence of the disease destroyed the horse on the fourth day. On examination, the spleen was highly inflamed and nearly gangrenous, while the surrounding viscera were unaffected.

A chronic enlargement of the spleen is less rare, and produces symptoms not unlike jaundice, even to the yellow tinge of the skin. Rupture also of the spleen occasionally occurs.

HÆMATURIA, OR RED WATER IN CATTLE.

RED WATER, as it is provincially called, is usually described as of two kinds; an acute and a chronic. This distinction is not however patronized by many reputed veterinarians, although Mr. Youatt, a practitioner of much celebrity, and one who has written well on the subject, treats of it under these varieties. It appears to be a disease of the digestive organs, more than an affection of the kidneys, and is, as we apprehend, justly attributed to derangement of the liver and stomachs. It often is ushered in by diarrhœa, to which, in most cases, constipation succeeds. Although it is not, as we have premised, considered to be in the first instance a true hepatic affection, yet, when it has taken deep hold of the digestive system generally, the liver becomes affected also, and its secretions are unhealthy, and morbidly stimulate the intestines, when the early costiveness often complained of gives place to an obstinate diarrhœa, differing in its morbidity from the early looseness by which the disease is ushered in; hence hæmaturia as a term is by many cavilled at, that being characteristic of a lesion of the bloodvessels of the kidneys, which certainly may become affected secondarily, but do not appear to be primarily so. A French veterinarian, M. Drouard, draws a very distinct picture of the complaint something after the following manner. 'It is rare,' he observes, 'that we are called in at the commencement of this disease; but when we do first see our patient, the following lesions usually present themselves. The pulse is slightly irregular—the urine high-coloured, or assuming a reddish tint—the animal preserving for a short time its spirits and appetite—the muzzle is abundantly moistened with its natural dew: but presently the breathing becomes accelerated—the pulse is small and wiry—the urine takes on a bloody colour—the coat stares—the muzzle now becomes dry—the secretion of milk, if the patient be a cow, diminishes, as does also the appetite, and there are occasional shivering fits, with alternations of cold and heat at the horns and the ears. The appetite by degrees entirely ceases—the secretion of milk is suppressed, or a very few drops only are yielded, and they are frequently rather of a muddy reddish hue. The urine becomes of a more decidedly blood colour; and afterwards it darkens even beyond that, and eventually is almost black: the pulse is small and frequent, as many as 80 in the minute—the beatings of the heart, however, can be heard at a considerable distance—the urine is voided frequently, and without pain—the loins will not bear pressure—the patient becomes exceedingly weak—the skin and the mucous membranes are deathy pale—the animal moans lowly and frequently—it at length lies down without the power of rising—the eyes are buried in their sockets, and the poor creature rapidly wastes away, becomes exhausted, and dies.'—*Veterinarian*, vol. xi.

Treatment of acute hæmaturia.—With all due deference to our continental vets. for an excellent exposé of this disease, we will turn to our own schools for directions regarding its cure. The treatment as pursued by many veterinarians in the cattle counties is thus laid down by one of them. 'If constipation has ensued previous to my being called in, and there is any excitement, I bleed according to the age, strength, &c., and confine my patient to an open shed or cool cow-house, strictly debarring all food of a solid nature, but allowing plenty of whey porridge, oatmeal gruel, &c. as diluents. If the animal will not take these things in sufficient quantities, I have them horned into her, and, as a purgative, give the following,—not for any supposed specific effect, but as a more certain purgative than salts alone, my motive also in giving the carbonate of ammonia being solely to insure the action of the physic, which it either does, or I fancy that it does,—℞ Magnes. sulph. ʒvi vel viii, sulph. sublim. ʒiv vel vi, pulv. zingib. ʒss, ammon. carb. ʒi. Mix and form a powder, to be administered as the case may require. Enemas of warm water or gruel should also be administered. I have seen hydrarg. sub. given in a pint of yeast produce purgation, when other remedies have failed, and saved life where the case was apparently hopeless. Purgation being fairly established, the practitioner must exercise his own discretion as to the further administration of medicine, although I must confess that I am in favour of mild stimulants, or, as they are generally called, nourishing drinks.'—*Veterinarian*, vol. xiii.

BLOODY URINE IN HORSES.

FARRIERS term this *pissing of blood:* here it arises sometimes from pure topical inflammation of the kidneys, in which case it must be treated as under that head: it may accompany a stone in the cavity of the pelvis of a kidney, or an ulceration of any of the urinary passages; but these are unusual causes. Violent exercise, by rupturing the small vessels of these glands, produces it more often, and therefore it frequently follows hard riding.

The *cure* must consist in restoring the healthy action of the parts, and promoting a healing of the vessels; and, particularly, in avoiding violent exercise and heavy weights. Diuretics are always hurtful. Mild astringents are proper, as alum, catechu, dragon's blood, logwood, &c. I have also known great benefit to be derived from a large strengthening plaister across the loins. In one instance, the following, given once a-day, produced excellent effects, after many other means had failed:—

Acetate of lead	ten grains
Vitriolated zinc	two scruples
Catechu	four drachms.

Make into a ball with conserve of roses.

In another obstinate case, permanent cure was effected by turning to grass, having first covered the loins with a strengthening charge.

DIABETES—PROFUSE STALING.

Diabetes insipidus is not an uncommon disease in the horse but diabetes mellitus is very rare; indeed, it is altogether disputed by some, but I believe without just grounds: on the contrary, though rare, we have reason to think it occasionally takes on the true characters of diabetes mellitus*. In its usual form, it appears as an immoderate flow of the urinary secretion, sometimes limpid, at others turbid, and of a whey-like appearance; I have seen it in both these forms. It usually originates in some extraordinary stimulus applied to those organs concerned in the separation of the urinary fluid from the blood, commencing sometimes with the digestive organs†; but more generally the effect appears confined to the kidneys, which become topically affected from some diurectic stimulants taken into the stomach, either in the form of food, as mow-burnt hay, some vegetable matters browsed from hedges and fields, or otherwise from diuretics too active or too often repeated. In its worst form, it is attended with an immense flow of urine, insatiable thirst, and rapid emaciation, with an increase of appetite at first, but a sickly one as the disease proceeds. In stable language it is called jaw-piss. Ship-oats when heated, and some particular plants in hay, are also supposed to occasion it: hard brackish water is also thought to do it. Lime water has been used with effect as a remedy, and other astringents noted in our Veterinary Medical Pharmacopœia may also be brought in aid.

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* Gibson describes the '*true diabetes*' as a disease difficult of cure, and as the consequence of 'long-continued sickness, old surfeits, or hard labour.' Hurtrel d'Arboval describes it thus: 'Diabète, excretion d'urin pale, d'un goût insipide et *douceâtre*, sucré ou miellé. *Le* diabète ne doit pas être confondu avec l'incontinence d'urine, ni avec les flux d'urine dans lesquelles ce liquide est momentanément évacué en quantité plus considérable que les boissons preses médialement avant ou depuis peu.'

† When I speak of its originating in the digesting organs, I do not mean that morbid state brought on by structural derangement, consequent to the usual debilitating causes of human diabetes, but to one produced by privations of good food and substitution of bad. Mr. Denny has observed more than a hundred cavalry horses labouring under it at one time, the consequence of bad forage; and it has followed damp and unwholesome lying at picquet: could it be here occasioned by the morbid action of the skin on the stomach? Mr. Castley described it as particularly prevalent in the British cavalry horses which occupied France subsequent to the battle of Waterloo, and where it was ascribed to rotten forage. Such was the constitutional disturbance, that the horses rapidly declined, lost their flesh and appetite, and many went blind.

Treatment.—As the cause, in general cases, is not very occult, it would be a prudent precursor to review the circumstances connected with the general management of our patient. Has he or she been subjected to any great privation; or been brought low by immoderate work, or by strong purgatives, or diuretics? Is the food good? Examine the hay, the corn, taste the water, &c.; and if none of these can be assigned as causes, we may begin to suspect some organic derangement. If there be merely a superabundance of urine over the liquids taken in without much constitutional disturbance, moderate doses of catechu and alum, with oak or willow bark, will be sufficient to check the flow; and the same remedies may be applied in cases where violent diuretics have been the cause. It will also be prudent to apply a warm strengthening charge over the region of the loins, which I have found very serviceable in the urinary fluxes in old horses. If the urine be very turbid, particularly if it have any tendency to a saccharine taste, and there is evident wasting of the body, loss of appetite giving reason to suspect much derangement of the digestive and assimilating powers, try the following, given in a strong infusion of chamomile, every day:—

Sulphuretted potash *(liver of sulphur)*	two drachms
Uva ursi, in powder	four drachms
Oak bark, ditto	one ounce
Catechu, ditto	two drachms
Opium, ditto	half a drachm.

Feed liberally with wheat or barley, or ground beans, but more particularly the former given in lieu of oats, intermixing the corn, feeding with occasional small soilings, or carrots, beet, &c. If this, after a sufficient trial, does not benefit, try the following night and morning, clothing the body warmly. Warm stabling and sufficient clothing are proper in all these cases; but in obstinate and violent ones, an extra quantity of surface-warmth is medicinal: lime water has also proved beneficial.

Nitrate of quicksilver	ten grains
Extract of belladonna	ten grains.

Conserve of roses to form a ball.

CLASS VII.

DISEASED COLLECTIONS OF FLUID WITHIN CIRCUMSCRIBED CAVITIES.

DROPSY OF THE HEAD.

Hydrocephalus internus is a rare disease in the adult horse as an idiopathic dropsy[*], but is much less so as an acquired one: it is also sometimes congenital[†]. It appears, in most cases, to be the effect of some morbid irritation of the brain or its membranes, terminating in serous effusion within the ventricles, or between the membranes. Such irritation may be acute or it may be chronic; as it may be sufficiently violent to produce the active symptoms of phrenitis or mad staggers, or it may occasion only a slow pouring out of the interstitial fluid, which shall occasion coma or sleepy staggers, or the meagrims; or it may shew itself in paralysis, when the fluid penetrates into or communicates with the spinal canal. In the *post-mortem examinations* of hydrocephalous subjects there has been very often found marks of both thoracic and abdominal inflammation: the lateral ventricles have been distended with serosity; the plexus choroides usually pale, sometimes studded with small tubercular spots; occasionally it has been much injected: medullary matter pale, and sometimes less cohesive than natural, as though softened by an excess of fluid. On the *treatment* I have little to offer; I would refer to Phrenitis, and to the general description of Class V, as leading to indications of practice. Great difficulties exist in determining when effusion is about to commence, when it is established, to what extent it has proceeded, and by what means the effusion can be absorbed or passed off. It is possible that some bold practice may yet be adopted to draw off the fluid by mechanical means. Absorption may be attempted by stimulating the surface of the head by vesicants, mercurial inunctions, and by exhibiting internally nauseants, purgatives, and diuretics; as well as by repeated small bleedings, all or any of which, as excitants of absorption, may be tried *ad libitum*,, at the discretion of the practitioner.

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[*] The French writings offer, however, several well-marked cases of true idiopathic dropsy of the head, principally in colts Hurtrel d'Arboval gives the particulars of two, one of which fell under his own notice; the distorted cranium now forming part of his cabinet, the other sent by M. Seurre, of the Lyon school. He also mentions the case of an adult: 'Un petit cheval de trait, *vieux*, et en mauvais état, quis depuis quelques jours chancelait en marchant: l'ouverture du cadavre fut faite, et l'on trouva que les méninges et les grands ventricules du cerveau contenaient environ quatre décilitres d'une serosité transparent.'

[†] It appears congenital in the horse, occasionally; but is observed with considerable frequency in calves. A very detailed account of one born with a calf protruded in the front of the head six inches in elevation and twenty-two inches in circumference; but the animal exhibited no signs of constitutional affection when it was punctured, and a quantity of fluid *('homogene')* of a light yellow colour, escaped. The calf lived eight days, and died then evidently from the effects of the operation and the subsequent examinations and experiments made.—*Hurt. d'Arboval, Dict. Vet. art. Hydrocéphale.*

DROPSY OF THE CHEST.

Hydrothorax, as a primary affection, is a rare occurrence, but, as a secondary one, it is very common: it consists in a collection of serous fluid within the cavity of one or both pleuræ. It is said that it sometimes appears encysted, by being separated from the general thoracic cavity by a membranous sac. *Hydrops pectoris* forms a very common termination of pneumonia, and appears to arise in these cases from a peculiar disposition on the part of the exhalent arteries of the pleuræ to secrete an inordinate quantity of serous interstitial fluid, during the active symptoms of pneumonia, or towards its close. Many gallons of fluid have been found so formed within a very short space of time. In some instances less rapid, the fluid has been discovered mixed with pus; and in others, coagulable masses are found floating in it. It is remarkable for yielding little or no monitory sound; indeed we ought not to expect it from an organ which has its contents filled with fluid. It frequently succeeds to pneumonia, particularly, as already observed, if pleuritic indications have presented themselves.

The *prevailing symptoms* are, breathing difficult, and that in the proportion of the water effused in the chest; the horse is seldom found lying, and if he does recline, it is but for a very short time. A few days of suffering reduces the pulse very much; while swellings, almost universal, are seen over the abdomen, the sheath, the thighs, and legs.

Treatment.—Mr. Percivall very justly observes, that this is almost an affair of desperation; and that therefore we must early attack our enemy by the usual means of combatting inflammatory action, as by bleeding, stimulating the bowels by aperients, the skin by medicaments that open the cuticular pores, and absorbents that take up the injurious fluid accumulations. It is, however, seldom that we can detect the disposition to inordinate secretion sufficiently early to attempt any means to restrain it; and when formed, we have seldom power enough over the absorbents to effect its removal through their agency. It is, however, always our duty to attempt it; and as Nature now and then effects a natural cure, we may occasionally assist her efforts. There is little doubt, in *acute* cases, that it would be the most efficient practice to proceed at once to the evacuation of the fluid by the operation of *tapping* the chest; for it is in the early stages of hydrothorax only that such operation has been successful; and as that has been the case, and as other means have usually failed, in all instances where the accumulation follows as an immediate termination of pneumonia, I would recommend that no time be lost. In cases of a more chronic or slow form, we may, on the contrary, first try other remedial means; among which it has been recommended to bleed, if any appearances of inflammatory action remain; but it must be taken into the account, that any remaining febrile symptoms are but consequences of the irritation produced by the presence of the fluid, and may be considered in the light of an hectic or asthenic nature, and as such would but ill bear the loss of blood. Nevertheless, we must not hence be deterred from the use of other means; as nauseants to promote absorption, and mild diuretics to lessen the serum of the blood, generally bid fairer; and which I have tried with apparent advantage; and if they have proved in the end delusive, other cases may be more fortunate[*]. Active friction to the chest, with the use of mild mercurial agents also, both outwardly and inwardly, may be properly applied; and rowels also; but when these are made use of, the horse should be liberally supported by the most nutritive food. Whatever method of treatment we adopt, we shall proceed on surer grounds, by first informing ourselves of the actual state of the thoracic cavity. The means of doing which are, by examining the pulse both by the heart and the artery; by percussion of the chest (see *Pneumonia*, p. 312), and by auscultation either by the naked ear[†], or through the medium of the stethescope. (See this word in the *Mat. Med.*) If the stethescope emits no sound, or a very feeble one only, we shall have reason to fear that the cavity to which it is applied is nearly full of fluid, and our only hope rests on the state of the other side; which, should it emit more sound, but in a slight degree only, although we are warranted in letting off the fluid, or in using any other means, yet our chances of success are extremely limited.

The *operation of paracentesis thoracis* consists in first making a slight opening through the integuments, which I prefer to thrusting in the trochar, which may probably wound the lungs. The situation most eligible for the opening is that wherein a depending orifice may be gained for the complete evacuation of water, without danger of wounding important parts by the puncture. If it be carried too low, the mediastinal folds, or even the pericardium, may be endangered; but in either of the costal openings, between the seventh and tenth ribs, nearly as low as their termination into cartilage (see *plate of Skeleton*), the opening may be made with an abscess lancet or a scalpel, towards the anterior edge of the rib, to avoid wounding the intercostal vessels, which do by first drawing the skin a little forwards or backwards, to ensure a future closing to the access of external air. By means of this integumental opening, carefully introduce a long and large trochar, unless the dissection with the scalpel be carried quite through integuments, muscles, and pleura at first; in which case, a canula only is necessary. But if the trochar be used for the puncture of the pleura, which is, I think, the best plan, provided it be done in an inclined manner, and with caution, direct it through the opening in the skin, over the posterior rib, upwards and backwards. If the hydrothorax be very fully formed, that is, if the cavity be nearly filled with serosity, less caution is necessary in the introduction of the trochar: but if the operation be performed more early in the complaint, then it is necessary to proceed more cautiously, to avoid puncturing the lungs. Having introduced the trochar only so far as to observe a gush of fluid, push the canula forward, retracting at the same time the trochar itself; after which fasten the canula around the horse, to prevent displacement. If both thoracic cavities be thus affected, proceed, after a proper pause, in the same manner with the other side[‡]. Coagula, or even the inflated lung, sometimes is found to obstruct the flowing of the latter portions of fluid; to obviate which, a bougie or piece of whalebone may be occasionally introduced up the canula, or the canula itself may have a few side openings. When the whole of the fluid has been withdrawn, remove the canula, and close the orifice by adhesive plaister and bandage, as it will be better to operate a second time than to admit air within the thoracic cavity; for although the same fears are not now entertained as formerly on this head, yet inflammation is apt to supervene, or external air gain admission between the lungs and its pleura. If pus be formed within the chest, its evacuation may be also effected in the same manner[*] (see *Hippopathology*, part i, vol. ii, p. 112.

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[*] Gohier informs us that he has been successful in hydrothorax by the administration of powerful diuretics, particularly of cantharides, with turpentine and soda; and it may be also noted, that the doses of cantharides he administers, as he informs us, without serious injury, are beyond any that our practice reaches to.

[†] 'Lors qu'on appliquait l'oreille au-dessus du sternum, on entendait un bruissement sourd et trainant, comme si l'on roulait un liquid dans un tonneau.'—*Hurtrel d'Arboval, art. Hydrothorax.*

[‡] It will hardly be necessary to remind the practitioner of the integrity of the division of the chest into two distinct cavities, and that consequently both must be punctured if the hydrothorax be universal; but of the propriety of opening the second cavity immediately, I have much doubt, and agree with the French veterinarians, that it had better be deferred until the next day, as will be seen by a reference to note on the operation.

HYDROPS PERICARDII.

CARDITIS, or inflammation of the heart, is apt to terminate by an inordinate effusion of serum within the membranous sac, called pericardium: it is likewise occasionally consequent on pneumonia. If it admit not of a natural cure, or of one founded on promoting absorption, as detailed for hydrothorax, no mechanical mean of abstracting the fluid presents itself.

DROPSY OF THE BELLY.

Ascites is to the abdomen what hydrothorax is to the chest, a morbid increase of the serous fluids which, in due quantity, naturally pervade these cavities. As an idiopathic and primary affection, it is, like hydrothorax, rare in the horse; but as a sequel. of other affections, it is by no means uncommon. The serous membranes of the horse appear very prone, from their vascularity, to inflammation, both idiopathic and secondary; and effusion into the cavities they garnish is a common consequence of their increased action: it is not unfrequent that this, taking place in one portion of membranous lining, is a signal for those of other cavities to take on a similar state, although the original affection was confined either to the serous membrane of a particular cavity, or to the viscera of that cavity. Thus it is not uncommon to find with diseased abdominal effusion that there is also water in both the thoracic and the cerebral cavities. Æquine ascites may be brought on by the connexion which the serous membranes have both with the skin and the kidneys, as secretory organs and fæcal emunctories. Whatever, therefore, interferes with the functions, may prove a source of ventral serous accumulation. It follows also, now and then, as a consequence of chronic hepatitis, that usual source of human ascites[*]. The most common origin, however, of ascites, is from acute inflammation of some thoracic or abdominal viscus; and it may appear singular, that it follows more commonly after thoracic attacks than abdominal ones[†]. It is thus that it appears as what may be called a chronic sequel to such pneumo-pleuritic cases as, had they been more acute, would have produced hydrothorax.

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[*] Barthélemy, in his course of lectures at the Veterinary School of Paris, directs the operation to be performed thus:—'On pratique la ponction du thorax, ou sur les parois costales, dans l'intervalle qui sépare les septième et huitième côtes des monodactyles, au-dessus de la sous-cutanée du thorax. On laisse les animaux debout, autrement ils pourraient s'asphyxier; ils sont d'ailleurs tellement émoussés qu'ils restent tranquilles. L'opérateur est pourvu de ciseaux, d'un bistouri droit et d'un trois-quarts; il peut se passer de ce dernier instrument, mais la canule est nécessaire: il coupe les poils, incise la peau parallelement à la longueur de l'intervalle intercostal; deux travers de doigt de longueur suffisent. Il incise aussi les muscles intercosteaux. Ayant recontré la plèvre, et poncturé, le liquide sort; mais les deux lèvres de la plaie se rapprochant, il faut introduire la canule; celle-ci se bouche, parceque le liquide tient en suspension des matières floconneuses, c'est pourquoi l'on introduit une petite baguette dans la canule, afin de désobstruer le passage. On a retiré jusqu'à deux seaux de liquide; mais la prudence défend d'en évacuer autant en une seule fois; le poumon ainsi que le cœur et les gros vaisseaux sont comprimés par le liquide, et, lorsque celui-ci s'échappe, la compression cessant tout-a-coup, le sang afflue dans les cavités du cœur, il en résulte un état de syncope, et même l'asphyxie; on ne doit donc retirer le liquide qu'à plusieurs reprises. Si l'on veut opérer sur la région sternale, il faût pratiquer l'ouverture au-dessous du cartilage xiphoide, avoir un trépan, couper les poils, la peau et les chairs, ponctuer jusqu'à la plèvre, et, lorsque le liquide est sorti, laisser se rapprocher les deux lèvres de la plaie, et recouvrir celle-ci d'un plumasseau agglutinatif, maintenu au moyen d'un surfaix. On a conseillé des injections aromatiques à la suite de la ponction de la poitrine, mais elles ne pouvraient convenir que dans les hydrothorax causés par le défaut de rapport du systéme exhalent avec le système absorbant.' It would be well for us if we found this disease as tractable as La Fosse describes it. 'La Fosse prétend que toutes causes cessant, l'hydrothorax peut se guérir par cette operation. Lorsque celle-ci peut, selon lui, sauver la vie au cheval, il plonge le trois-quarts dans le thorax, d'un côté, ou de l'autre, à la partie inferieure de la huitième côte, à sa jonction avec son cartilage; il vide à peu près la moitie du liquide épanché, ensuite il injecte dans la cavité thorachique environ la même quantité d'un décoction vulnéraire. Deux heures après, il tire les deux tiers du liquide restant, et ne fait plus l'injection que d'un tiers; il met deux autres heures d'intervalle, après lesquelles il évacue, autant qu'il est possible, tout ce qu'il y a de fluide, puis il injecte deux litres environ de la même décoction, légèrement vulneraire, qu'il laisse deux heures. Au bout de ce temps, si, en tirant la liqueur injectée, il la trouve diminuée de quantité, il en infère que le système absorbant reprend ses fonctions dans l'organe malade, et il pense qu'il y a tout lieu de compter alors sur la guérison. Il réitère encore une fois la même injection, qu'il évacue de même au bout de deux heures, et il s'en tient là. Ce traitement, selon La Fosse, est presque toujours certain dans l'hydrothorax survenu à la suite *d'une inflammation*.'

The *symptoms* usually first noticed are œdema of the external parts of the belly, chest, and sometimes of the extremities; and which often bring to the recollection some lassitude and disinclination for exertion lately apparent. The urine is made in smaller quantities than natural, and some costiveness is present. As the serous accumulation proceeds, the belly becomes rounder, and, on striking it, emits a dull tense sound: the pulse and breathing both now become somewhat hurried, the former being small and but little developed. The early constipation gives place sometimes to diarrhœa of fœtid stools, and that particularly where the liver is much affected and the disease is much advanced; at which stage the pulse is often found to be hardly perceptible by the artery, but to vibrate with a peculiar thrill at the heart. The appetite now fails, peritoneal irritation produces colicky symptoms frequently; and in this way, being occasionally but little disturbed, and at others very ill, a few active symptoms carry off the poor beast. I would observe here on what may be called a marked and distinctive symptom of ascites, which is the inaptitude to bear bleeding. It invariably produces a tendency to asphyxia; the pulse wavers, becomes indistinct; the horse weaves and reels, and this occurring when the quantity of blood abstracted is small, gives reason to fear ascites as the cause.

The *post-mortem examination*, as may be supposed, very frequently shews adhesions of the pleura and disorganization of the substance of the lungs; the kidneys are often pale within; the liver sometimes much diseased, sometimes but little so; but always, I believe, it will be found somewhat altered. The mesenteric folds are often thickened, adherent, and shew coagulable deposit on them; and the peritoneum is also seen frequently thickened either by original inflammation, or by subsequent pressure and irritation. The fluid encysted is serous, occasionally (though seldom) muco-purulent; sometimes uniform like the human, but more frequently, like other serous accumulations in the horse, at least like those of the chest, it is mixed with coagulable masses or flocculent portions. The quantity varies, but is never enormous, principally because it is seldom a primary disease, as in the human; but, on the contrary, is secondary to some actively fatal affection; or otherwise the horse is destroyed ere the quantity becomes great.

The *treatment* of ascites, like that of hydrothorax, promises little; because it is rather a symptom of visceral disorganization than simple irritation on the secretory surfaces: we are warranted, however, in attempting the removal of the fluid by stimulating the absorbents, as detailed in Hydrothorax; and by strengthening the system generally by tonics. We must, however, use no depletion, but by such means as follow the intention hinted at: it may also be observed, that purgatives are less admissible here than in hydrothorax: on the contrary, they may be expected to occasion much constitutional disturbance. More dependence is to be placed on active diuretics; external frictions, frequent and long continued: gentle but often repeated exercise, and warm clothing.

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[*] A marked instance is detailed in vol. iii of *The Veterinarian*, which occurred in the practice of Mr. Kerr, of Southampton, a veterinary surgeon of great apparent observation and intelligence:—'The liver presented a singular appearance; was of a light clay colour, and remarkably soft and pulpy.' In this case we learn that the lungs were also greatly disorganised by internal ulceration. But numerous similar cases in human practice fully proved that the lungs were not primarily diseased, but evidently became so secondarily to the hepatitis; and which analogy, were it not borne out by æquine observation also, would convince me that here also vomicæ were only sequelæ of the hepatic disease.

[†] Three ascitic cases, the detail of which followed each other in quick succession, are to be met with in the 2d volume of *The Veterinarian*, all of them evidently derived from pneumonia or pneumo-pleuritis. Of abdominal plegmasiæ, peritonitis is the most likely to produce it. I may take this occasion to remark, that if any evidence were wanting of the advantage of a periodical dissemination of the accumulating facts and constant extension of our art, here is a prominent one. A disease hardly before recognised is brought into general notice, and with circumstances which throw a valuable light on veterinary pathology.

But as soon as fluctuation is distinctly perceived, at once proceed to the operation of *tapping*, because it will not interfere with auxiliary remedies of any kind; and, like hydrothorax, it will only offer a reasonable chance when performed early in the complaint.

Paracentesis abdominis is a simple operation, and does not differ, in any essential particular, from that described for hydrothorax. The spot chosen for the opening should be one that will avoid wounding the stomach, the liver, or the epigastric or other vessels; and the most eligible for this purpose in the horse is the middle line between the umbilicus or navel, and the sheath. In the mare, any portion of the linea alba between the umbilicus and pubes, that is, any part of the median line of the belly situated between the bag and navel, may be chosen for the puncture, which may be done under exactly similar circumstances; and in both, the operation must be conducted, and after treated, as in hydrothorax, with the exception, that here only one uniform cavity is to be emptied, and that the whole may be evacuated at once, and allowed further to drain off, by means of the simple application of a linen bandage without padding or plaister, whatever fluid may remain, or may form after the canula is withdrawn. Should any prospect of benefit be derived, endeavour to prevent a recurrence by strengthening the general habit.

DROPSY OF THE SPINE.

Hydrorachitis may be idiopathic, or it may be connected with the former disease; and we owe this knowledge to the recent inquiries and examinations into the anatomy and physiology of the medulla spinalis. The discovery of an encephalo-spinal fluid by Majendie, and since confirmed by Dupuy and others, have led to very extended pathological views of the diseases dependent on disturbance in the flow of nervous influence; and it becomes us, in reference to many diseases in which an appearance of fluid in the cerebral ventricles is supposed to furnish a rationale for the symptoms which present themselves, to be aware that such fluid may probably be furnished by the spinal canal; or that the mixed symptoms which characterise all the diseases of Class V, may be dependent on a diseased increase, mutually spread over the cerebral cavity and the spinal canal. I am disposed particularly to call the attention of the veterinarian to this circumstance in his consideration of the paralyses of the horse; and more especially to the view that has been taken of the cause and origin of kumree, so indigenous to India. It is not uncommon as a congenital disease, and has been observed in foals; now and then in the calf; but more frequently in the lamb. Cases of the congenital and the adult affection are found in the French writings; and the effects, as may be supposed, are paralysis. (See Class V.)

CLASS VIII.

DISEASED COLLECTIONS OF FLUID WITHIN THE CELLULAR MEMBRANE.

DROPSY OF THE SKIN.

Anasarca, Œdema, and Water Farcy.—Synonymously we need make no distinction between these terms, particularly the two first. As generally accepted, œdema carries probably rather a more local habitation with it; and thus we say an œdematous swelling: but anasarca is more frequently used to designate an extensive dropsy of the cellular membrane. Both, however, have the same origins, are accompanied by the same symptoms, and require the same curative means. It differs from ascites principally in its external seat, which is sometimes partial and sometimes general. It also appears under different forms, as it has different origins, or according to the nature of its continuance; and its terminations are also under the influence of these circumstances. A debility of the absorbing system generally is usually observed in the spring and autumn; and at these times either there is a superabundance of fluid poured out, or the absorbents want energy to carry it off: certain it is, the balance of power between these acts is not equal. There is usually, however, some atony of the whole system, and the œdema, which in these cases consists of pure lymph only, disappears as the constitution establishes itself. At other times anasarca and œdema appear as accompaniments or sequelæ to acute diseases which have disturbed the functions generally, and the secretions particularly, in which case the absorbents become irritated: to the œdema is added tumefied lymphatics; and the affection becomes an anomalous symptom of the farrier's

WATER FARCY,

That Protean complaint beyond definition. At the close of long febrile affections the œdema is such as not only to tumefy the lymphatics, but sometimes to make its way through by ulceration or by rupture of the vessels of the skin, and which proves, in some cases, a parent of the true farcy, and consequently of glanders. The latter case, by a very easy transition, can degenerate into cracks or grease, as we frequently see. Œdema, as a symptom, is both favourable and mortal. When partial in epidemic catarrh, it offers a prognosis of recovery; when universal, in diseases of an asthenic type, and such as border on malignity, it is very unfavourable. Its *treatment* involves all we have already detailed on hydrothorax and ascites. Internal tonics; external stimulants, by friction, and by sustaining bandages; liberal feeding; mild but continued exercise. The free use of green food, as being at once diuretic yet nutritive, is indicated; or in winter spear the corn, or give carrots, &c. &c.; for succulent vegetable matter is of much consequence.

Water farcy, therefore, has as much to do with anasarca as with either true farcy or glanders. Gibson is not very wide of the mark when he describes it as of two kinds; one resulting from febrile attack, the other partaking of the nature of dropsy. A limb in these cases is often suddenly seen to be gorged, and often so much so, as to press out the diseased accumulations, which are seen around it like dew drops. Mr. Percivall considers it as of an inflammatory character, as did also Professor Coleman. One singularity of it, which is noticed by Mr. Percivall, and must have been also observed by others, is, that it often confines its attack to one limb only. It will sometimes break out in a state of grease; and sometimes it will extend itself to the opposite limb also.

The *treatment of water farcy* should be prompt, or true farcy may follow. Mr. Percivall recommends to take two gallons of blood from the horse, and to follow that up by a mercurial and aloetic purge: bleed again in two or three days, and continue a ball daily of a mild kind, composed of aloes, calomel, digitalis, and Venice turpentine; and follow this treatment with tonics, as blue vitriol, gentian, &c.

SWELLED LEGS.

Partial œdema of the extremities, more often of the *hinder*, is too well known to need much description. What has been said already will apply here: debility, partial or general, is the cause, and it becomes either proximate or remote, according to circumstances; but it is still the grand agent, as we know by the phenomena occasioned. At the close of long continued diseases that weaken much, the legs always swell; and it is reasonable to expect they should do so, when we consider how far they are removed from the source of circulation, and that their fluids have to rise perpendicularly, which certainly increases their difficulty in propelling their contents, and also excites the secreting capillaries to an increased deposit within the cellular membrane. The absorbents may also be themselves affected, but it is more than probable they are the least part of the cause, for we find them, in these cases, fully equal to taking up the fluids on the increase of stimulus, that is, a little exercise soon removes the whole swelling. Sudden changes in the temperature of the atmosphere that horses are used to, or in the degree of clothing they wear, or hasty alterations in the nature of their food, may any of them occasion swelled legs; and such effects may occur either by these causes diminishing the means that keep up life, and thus producing a *general* debility; or, they may act by adding to such means as are used to promote life, by which a general plethora may ensue, but still equally productive of a *partial* debility: for the balance of power being unequal here, the legs cannot resist the pressure on them, and swellings appear. Thus it is, that when horses removed from grass, or from a straw yard, are brought at once into a hot stable, and fed highly, their extremities swell immediately: for the powers of life are unduly pushed before the parts have taken on a capacity for this increased action, that is, before the transporting vessels are able to act on the increased secretion: therefore arises a necessity for bleeding and physicking in these cases, to keep down the plethora, but which are found to be less necessary when this alteration is gradually brought on. Standing in the stable, with a full allowance of food, and little exertion, acts in the same way, and from the same cause; and hence exercise is doubly useful: first, by promoting other excretions, and secondly, by the increased action it excites in the absorbents. On the contrary, turning horses out to a straw yard from full feeding, warm clothing, and a hot stable, may likewise bring on swelled legs, by occasioning a general debility: but so much do horses improve as they approximate a state of nature, that though this is an equal change with that of removing them hastily into stables, yet they comparatively seldom suffer from this treatment: but when they do suffer, it is, in general cases, acutely. It is thus that standing in snow, or in long-continued wet, produces swelled legs, by weakening the parts, and by being unfavourable to absorption. It is very usual also for horses to have œdematous extremities in autumn, at which period the powers of life are unequal; there being an increased action in the skin to produce new hair rapidly, and those parts most remote from the seat of circulation are consequently unequally supplied with vital energy.

Cure.—This will not be difficult, when we make ourselves master of the cause. In removing horses from grass to the stable, with the precautions mentioned, it may be prevented; but when it has occurred, it must be combatted, in plethoric full horses, by lessening the general action of the vascular system at large, at the same time increasing the individual strength and tone of the affected parts in particular. For this purpose bleed; reduce the diet, if too full; give bran mashes and alteratives, with three or four hours' *walking* exercise every day, and sufficient friction to the legs, and bandaging if much gorged. Intervene between the alteratives one or two doses of active physic; and, if the swelling prove very obstinate, insert a rowel in each thigh to alter the action: in general cases, however, these are unnecessary. But when swelled legs occur in a horse that is thin and impoverished, the general debility must be counteracted to promote a cure, by feeding somewhat liberally, particularly with a mixture of the edible roots, as carrots, parsneps, mangel-wurzel, &c. &c.; it is aided also by giving mild diuretics united with tonics, as prescribed in ventral dropsy. Purging in this case, though it may lessen the swelling *momentarily*, by carrying off the watery parts of the blood, yet it will probably increase the enlargement *finally*, by further weakening the system in general. Apply friction to the legs; use gentle exercise, but not to produce exhaustion. The weakened vessels having been long distended, will perhaps not readily regain their tone; they may therefore, in this case, be assisted by bandages moistened in astringent solutions. When it occurs among cart horses, haybands may be used for this purpose, dipped in cold water, at which some grooms and carters are very expert. In other instances, strong woollen of any kind may be made use of; but flannel forms the best bandage, when evenly and firmly applied, by means of a roller of three yards in length and four inches in breadth. Occasionally we meet with cases wherein the legs appear to become habitually enlarged, or where the recurrence of the swelling is so frequent as to occasion continual trouble: in these a permanent bandage is best, produced by firing, and which, in this case, should be done in nearly perpendicular lines; for, by corrugating the skin, and in some measure lessening its elasticity, it becomes itself a bandage to the weakened vessels; but if the firing be done in any other than a perpendicular or nearly a perpendicular direction, the effect is in a great measure lost.—See this subject farther pursued in *Grease;* see also *Condition.*

EXTRAVASATION OF BLOOD.

Ecchymosis is a pouring out of blood into the cellular membrane, either the consequence of spontaneous or of accidental lesion. In the former case, it is usually symptomatic of inflammation, and as such must be attended to in common with its cause. In the latter, it usually results from external violence, and comes under the popular term of a *Bruise* (which see). An injury of this kind may so affect the organization as to render it impossible for the extravasated blood to be re-absorbed; in which case both the extravasation and disorganized parts become involved in one common sphacelus, and either a healthy ulceration and granulation restores the portion, or the constitution sinks under the process, and life is destroyed (see *Inflammation).* In lesser injuries, the extravasated fluid is absorbed; or, if it remains, it becomes either fully organized, or it continues as a hardened tumour, its aqueous portion disappearing.

EXTRAVASATION OF AIR.

Emphysema is the escape of gas into the cellular membrane, from morbid combinations within; it is, therefore, sometimes seen in the pestilential epidemics which occasionally rage, though fortunately but seldom, with us. Emphysema is also brought on by the entrance of the atmospheric air into a wound, from which it makes its way more or less extensively throughout the cellular tissue. When it happens within the cavity of a joint, it often confines itself to that only: but in other cases, it permeates through the whole cellular surface, from the head to the tail, rendering the unfortunate animal one bloated mass; and which soon destroys him by its irritation, unless it be carried off by proper means. It was formerly a custom to make a slight puncture into the integuments of the elbow or arm, and by means of a quill to blow a quantity of air into it until the whole shoulder became distended, as a cure for a shoulder strain. It is also still a custom to make veal *emphysematous*, by blowing air from the mouth of a butcher into any point of the carcass of the dead calf, which plumps up the cellular tissue, and takes off that flaccidity common to the young animal. The most common origin of emphysema, however, arises from lesion of the aërating organs, as wounds of the trachea, bronchia, or substance of the lungs: a broken rib, by being forced inwards and puncturing the pleura, is a common cause: it may follow ulceration of the lungs also; but this is rare. The presence of air within the cellular membrane is always a source of irritation: when, therefore, it is very extensively diffused, it may so irritate as to affect the powers of life; and it does so by producing all the symptoms of asthenic disease. Two indications, therefore, present themselves,—to remove the air by small punctures, and to support the constitution by stimulants and tonics. If a re-accumulation takes place, force it out by moderate pressure and gentle frictions, and endeavour then to keep it out by bandages to every part where they can be applied: if possible, cut off the communication also with the inlet by establishing adhesive inflammation in the part.

CLASS XI.

CALCULAR CONCRETIONS.

Stony Concretions have long been noted in some parts of the body of the horse; and a more intimate acquaintance with æquine anatomy and that of other domestic animals will probably shew us that they are almost as universally formed within the various organs of their bodies as in man. *Cerebral calculi* are occasionally detected as well in the horse as most other domestic animals. *Salivary calculi* are more common, and are now and then met with in the substance or the ducts of all these glands, but principally in the parotid, where they occasion tumefaction, and from whence they should be dextrously extracted: avoiding as much as possible wounding the larger salivary duct, and uniting the parts as quickly as possible afterwards by establishing a healthy inflammation[*]. *Biliary calculi*, from structural peculiarity in the hepatic system of the horse and his congeners, are not frequent; but in horned cattle, in consequence of the greater complexity of the biliary flow, in them are more often found. *Gastric calculi*, are now and then met with in the horse, but much more frequently in the ruminants.

INTESTINAL CALCULI.

Stones in the intestines are sufficiently common in the horse, but are less so in the cow, where the hurried passage of the food would be likely to prevent the accumulation; while in the blind pouch of the cæcum or the vast pockets of the large intestines of the horse they are safely lodged and form enormous concretions, and often occasion dangerous colics, by accidentally altering their situations. Whenever, therefore, colics occur frequently without any apparent cause, they may be often proved after death to be referrible to irritation from these displacements. I have, myself, met with several such[†].

It is evident that this is an evil we have little power to combat; if a horse by passing a stone with his fæces indicated a constitutional disposition to separate sabulous matter from his food, and afterwards to concrete it by the mucus of his bowels; by restraining him to a diet not leguminous, as well as by accustoming him to eat salt, we might somewhat alter this habit; but the removal of a stone actually formed, unless it could be forced into the rectum (by a hand introduced into the cavity of the abdomen), and from thence be extracted, is hopeless: and even this remedy would be a most hazardous one.

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[*] Le procédé opératoire consiste à faire une incision sur la tumeur formée par le calcul, dont on obtient la sortie au moyen de la pression exercée avec deux doigts placés de chaque côté de l'incision. Après cette opération, la salive s'écoule, et les conduits se dégorgent subitement. L'écoulement persiste presque toujours, et entretient une ouverture que l'on a de la peine à fermer, si même on y parvient. Pour prévenir cet accident, toujours fâcheux, on doit, dès que l'operation est terminée et que les canaux sont dégorgés, rapprocher les deux bords de la plaie, et les maintenir en cet état par un emplâtre agglutinatif, ou même par quelques points de suture; afin de favoriser la cicatrisation, il est bon d'exercer une pression sur le canal excrétreur, du côté de la glande, pour arrêter l'afflux de la salive. Dans le cours de ce traitement, on doit prendre toutes les précautions nécessaires pour empêcher les mouvemens des mâchoires, et donner à l'animal des alimens liquides qui n'exigent aucune mastication. Il ne faut cependant pas le tenir trop à la diète; car le sentiment seul de la faim excite une sécrétion abondante de salive. Mais toutes les incisions pratiquées, soit sur le canal parotidien, soit par sur le corps même de la parotide, ne donnent pas lieu à l'établissement de fistules, c'est ce que quelques faits prouvent. Vieillard jeune a extrait des calculs salivaires à trois chevaux de troupe sans qu'il en résultât de fistule. Girard a vu aussi une incision faite sur toute la longueur de la glande donner lieu à un écoulement considerable de salive, et parvenir néanmoins en peu de temps à une cicatrisation complète. Du reste, l'extraction des calculs dont il s'agit s'opère quelquefois. On a mis sous les yeux des professeurs de l'ecole vétérinaire de Lyon un calcul extrait du canal salivaire d'une vache: ce corps était de la grosseur et de la longueur du doigt; était composé de cinq à six pièces qui formaient entre elles autant d'espèces d'articulations; il s'était formé sur le contour de la mâchoire postérieure, dont il gênait les mouvemens. Un autre calcul salivaire du poids de quatre-vingt-huit grammes (deux onces six gros), a été envoyé à la même école, après avoir été extrait, par Christin, d'un des canaux parotidiens d'un âne, qui le portait depuis environ cinq ans. Ce calcul était formé de trois pièces articulées, dont la plus petite occupait le milieu. On a aussi extrait du canal de Stenon, à l'école de Lyon, deux autres calculs salivaires très volumineux, l'un sur une mule, l'autre sur une ânesse. Le premier de ces calculs pesait deux décagrammes (six grosse): le second, quatre décagrammes et quatre grammes (treize gros); l'un était assez uni, et percé d'un côté de quelques petits trous, comme on en voit sur certains cailloux; l'autre était raboteux dans toute son étendue.

[†] The composition of these calculi varies, but most of them exhibit sabulous matter, which first collecting around some accidental nucleus, as a nail, a small stone, &c. &c., increases in concentric lamellæ, each strata differing in colour as the various ingesta yield matters of various deposit, or as the state of the alimentary canal forms various chemical decompositions. Some are so dense and compact as to bear a polish; while others are more soft and friable. In some instances they appear principally composed of inspissated mucus, mixed with indigestible matter, agglutinated into a hardened mass or masses, taking on the shape of the dung, from their lodgment in the sacculi of the colon, or other large intestines. Sometimes several exist, in others one alone of great size; or two or three of considerable magnitude have been found with sides adapted to each other; by which it would appear, that, notwithstanding the peristaltic motion, they were principally in a state of comparative rest: to which circumstance we must attribute their remaining altogether innocuous in some horses; for they are found after death in some that have never been known to have had a fit of colic in their lives. When we consider the habits of this animal, whose every mouthful, whether taken in the field or stable, must be pregnant with siliceous matter, we need not wonder at the aggregation of the particles so soon as they meet with a rallying point. It has been observed, that they are very common among millers' horses, as supposed from feeding much on bran, &c.; the mucilaginous nature of which food, it is thought, concretes the minute siliceous particles detached from the grind-stones used to break the various farinæ.

URINARY CALCULI.

Stones in the kidneys, though not frequent, are not altogether unknown in the horse; and as we know these animals are much subject to disturbances in their urinary secretion, we might, *à priori*, think it very probable that the siliceous matter which is separated from the blood might aggregate there *en masse*, as well as collect in the bladder; but we have stronger evidence than supposition, for *renal calculi* have been found in horses who have died under symptoms which might have been mistaken for very acute enteritis. We may also suppose, that the early accumulation would occasion irregular and diminished secretion of urine; followed, at length, by a bloody purulent mixture with the urine, until more active symptoms would arise, and carry off the horse. Renal concretions might be removed in their early state by remedies tending to decompose them in the urinary pelvis, or with more probability by such as, by relaxing the passages, might wash them away while small. We can suppose also that the passage of a calculi from the kidney may be arrested within the ureter: such cases are described by French authors*; but hitherto, I believe, have been not remarked on here.

VESICAL CALCULI, OR STONE IN THE BLADDER.

The presence of stone in the bladder has long been acknowledged as a disease that has occurred in the horse; but it was always considered as a very rare one. Our more extended knowledge has brought many cases to light, and we now rank it among the fixed and ordinary members of our nosology; it also exists in horned cattle; and swine are not exempt from it. It is by no means improbable that it does occur more frequently than we are aware of, as would appear when we recollect how many horses are parted with on account of being subject to what is considered habitual strangury, the supposed consequence of a strain. Hereafter, therefore, all cases of this kind which have resisted the ordinary treatment, and are not based on a known cause, should be subjected to examination per ano†.

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* 'Il se font sentir, suivant Chabert, à la main qu'on introduit dans l'intestin rectum. Le principal symptôme est le ralentissement et même la suspension du cours de l'urine. Dans le cas de suppression de ce liquide, elle est complète ou incomplète, selon que les corps calculeux occupent les deux urétères ou un seul. La diagnostic est toujours obscur, et le pronostic grave. Les rémédes sont tous insuffisans. Chabert pense qu'on doit tenter de faire couler les calculs dans la vessie; si l'on n'y parvient pas, il assure qu'on peut inciser l'intestin et l'urétère, et faire ainsi l'extraction du corps étranger. Gattoin a en envoyé à la Société royale et centrale d'agriculture l'histoire de la maladie et de l'ouverture d'une vache dans l'urétère gauche de laquelle il trouva plusieurs calculs qui avaient occasioné une dilatation considerable du canal, une rétention d'urine au-dessus d'eux, et tous les accidens qui avaient précédé la mort. Ces calculs, de la nature de ceux qu'on trouve dans la vessie et dans l'urètre des bœufs, avaient une couleur metallique bronzée très brillante; ils etaient lissées, irreguliers et pesans: l'un d'entre eux, plus volumineux, et composé de plusieurs morceaux réunis, avait une forme triangulaire assez bizarré.'

† 'Although the same constituent principles enter into the composition of the calculi found within the bladder of the horse and other monodactyles, still the stones themselves differ in many respects. They possess a urinous odour which time slowly dissipates, but which exposure to the fire renews; and also a disagreeable flavour, partaking of that of the urine of the animal from which they have been extracted. In four horses and one ass we have met with the *soft stones*, of the consistence of paste, growing harder towards the centre; also becoming so by exposure to air, and at the same time friable, and easy of reduction to powder. Commonly these vesical concretions form petrifactions, more or less compact, mural, tuberous, or grained; of varied form and magnitude, possessing neither uniformity of colour, consistence, nor interior structure; they may lie either loose or encysted within the bladder. Generally, they have a yellowish tint, inclining to a white. Some are ovoid, others elongated and flattened; some, again, spheroid. Some are less compact in the centre than towards the circumference; a smaller portion possesses a nucleus of some substance different from that of the stone itself. In some the component material is confusedly heaped up together, without any discoverable arrangement; in others, it is so amassed as to form distinct concentric layers, whose number is regulated by their thickness. Altogether, vesical calculi may be conveniently classed

The *symptoms* which denote a stone in the bladder are various. M. Girard, the learned Director of the Royal Veterinary School of Paris, in his Memoir on Vesical Calculi in Horses, on this point observes, 'Generally speaking, a stone may exist for a length of time, and acquire considerable magnitude, before it is productive of any perceptible disorder, or at least such as to direct the attention of the groom to the complaint, or make it certain that such is its real nature. The sedimentous depositions which we have ranked in the first class of vesical concretions, are indicated by the urine gradually becoming thicker and whiter; by frequent desire to stale: by the difficulty and pain with which these desires are executed. In one case, the penis being in a state of paralysis, hung down out of the sheath. A calculus may lie over or within the neck of the bladder, creating more or less difficulty in the expulsion of urine, or inducing complete retention. In general, however, its irritation occasions frequent staling. Sometimes the urine is bloody, and voided with distressing and painful efforts. The irritation may run so high as to give rise to colics, which may be either intermittent or continued. It is always an easy matter to distinguish between these colics and common intestinal gripes. So long as the pain is not very acute, the subject of cystic colic paws, makes efforts to strike the sheath with his hind feet; looks back at his flanks, even reaches them with his teeth, and every now and then shakes his head. Should the pains increase, the animal will lie down and roll, experience occasional relief, and, in fact, display the symptoms of common gripes. The sweat the animal breaks into diffuses a strong urinous odour. In this paroxysm of pain, mares have been known to expel the calculus, and thereby obtain momentary relief, and from that time to recover.'

The *treatment* of stone in the bladder may either be founded on attempts to dissolve the mass, on chemical principles, within the sac; or to promote its expulsion by pressure; or to extract it by section. From the composition of the vesical stones of the horse being found soluble in very weak acids, it was thought possible to dissolve them within the bladder; and a fortunate case, wherein vinegar mixed with water and thrown up the urethra did so act, raised hopes that this method might be equally fortunate in other cases. But not only has the bladder been found in some instances unable to bear the irritation, but the solvent power itself has proved inert, so that this practice has been much abandoned. An attempt, therefore, may be made to *force* it out from the bladder through the urethra, to which we should be more particularly led when we found it already lodged within or near the neck of the organ, in which case we should attempt it by a judicious pressure by means of a hand within the rectum, assisted by the other in the line of the urethra: if the stone be small, it may be brought forward, and made to turn the ischial curvature by lowering the penis as much as possible; from whence it may be guided still farther until a forceps, introduced from the point of the yard, may reach it. If it can be passed no farther than the curvature, it must be cut down on. When a larger stone is found within the bladder than can be extracted this way, it is evident that, unless we attempt to crush it*, we must proceed as detailed under *Lithotomy*, among the *Operations*. It happens that calculi are occasionally of themselves forced from the bladder into the urethra; such a case is related by the late Mr. John Percivall, in which the methods just detailed apply. In the female, this method

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into four kinds or varieties: 1st, The soft species, whose consistence increases inwardly; 2d, Those yellowish or whitish stones whose surface is asperous, or simply grained, and whose interior discovers an irregular amassment of saline matter, more or less coherent: these form the friable concretions which Lafosse alludes to when he directs us to crack the stone (if too large to be extracted) with the forceps. The 3d kind includes those which display concentric layers, but possess no nucleus: they are commonly grey, grained, and harder than the preceding kind. The 4th class is formed of those possessing *nuclei*; of which those composed of concentric layers exhibit a mural surface, and a hardness approaching to silex; others, less compact, display a granulated exterior, and are areolated within.'—*Girard's Memoir*.

* An ingenious artist invented a machine by which a stone might be crushed in the human bladder; and if it have been made applicable there, it might here be made doubly so, from the increased diameter of the urethra admitting of a machine of much more power. It is, however, unfortunate, that we must even then make an ischial opening in the urethra for the introduction of the instrument, which would leave us only these benefits, that our danger of wounding the artery of the bulb would be avoided, and a risk of burrowing sinuses forming afterwards.

of extracting the stone will usually succeed by dilating the urethra mechanically; and it has been also proposed by a proper instrument to attempt the same method in the horse, but which could only be done when the stone was of a moderate size.

CLASS X.

ANIMAL, VEGETABLE, AND MINERAL POISONS.

RABIES.

THE *rabid malady*, or *madness*, as it is popularly, and with characteristic truth so called in the horse, is never *spontaneous*, but always *acquired*, from the application of the rabid virus (the saliva), and, as more generally believed, from a member of the canine or feline tribe only. Usually the inoculation takes place by means of a *bite*.

The *symptoms* of rabies in the horse are various[*]; it usually, however, commences rather suddenly by some symptoms of uneasiness, and sudden breaking out into profuse sweats: I have known it attack a horse at work, who continued to alternately draw his load and stop distressed and impatient: in a few hours, however, he becomes completely unruly, he stamps and paws violently, and attempts to disengage himself from his halter. Though *madness* be a complete misnomer in the dog, it is by no means so in the horse; for within twelve hours from the attack he is commonly frantic: and I have seen one that levelled with the ground the whole of the internal fitting up of a six-stall stable, himself sweating, snorting, and foaming amidst the ruins. The disease follows the inoculation, or bite, at the same periods as in other animals; that is, from five weeks to three months: but I have observed, as in dogs, its attack is always quickest when the bite is received in the head. On an examination made by myself of the morbid appearances after death in two cases, there were great inflammatory marks in the lungs, as well as in all the thoracic viscera; the stomach and bowels also, particularly the latter, participated in the affection. The meninges of the brain were likewise suffused with blood. In a case related by M. Dupuy, to this last symptomatic appearance was added 'a softening of the spinal cord, while the medullary mass resembled a thin caseous matter. The salivary glands, and particularly the parotids, were exceedingly red and infiltrated with yellow serosity.' Here I suspect is a strained analogy to connect this case with the hydrophobous character which is attributed to it. I make no doubt but that all the parts of the head would be rendered highly vascular from *exertions*, such as it is impossible that any one can conceive without witnessing them: but no engorgement of the salivary organs beyond the surrounding parts existed in the cases which I examined, nor have they appeared in those detailed by others; and as my attention was particularly directed to this point, it could not have escaped my observation. The whole muscular system was discoloured and softened, and the cellular texture studded with ecchymosis.

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[*] In a case related by Dupuy, the animal *rolled* and *kicked* incessantly, and *cried* plaintively; and it is related in this case that *the water offered him caused convulsions and the most decided horror:* on which subject I am somewhat sceptical. I believe hydrophobia to be a *pathognomonic* symptom to man alone; and out of hundreds of rabid animals I have seen, I never observed it in one. I must, however, own, that M. Dupuy's account is somewhat borne out by Mr. Youatt, who says in two cases, 'I fancied I saw something very much resembling hydrophobia. The thirst was excessive, but the act of swallowing was performed with a forced gulping effort, and suddenly was snatched from the pail with a strange contraction, a kind of *risus sardonicus* of the lips.' As a proof of variety in rabid symptoms, in one of this gentleman's cases, a horse belonging to Mr. Keat, which had been bitten in the near leg behind, Mr. Youatt observes, 'whenever I approached him on that side, he was agitated and trembled, and struggled as well as he could (he being slung); and if I touched him with my finger only, the pulsations were quickened more than ten beats a minute. When I went round to the off side, he permitted me to pat him, and even sought my notice.' Contradictory as this account is with the violent and furiously vicious habits noticed as common in these cases, it is, however, strictly correct. I accompanied Mr. Youatt to see this extraordinary case, and can vouch for the truth of his account.

Mr. Youatt has also observed inflammation at the back part of the mouth, and at the top of the windpipe: but he does not notice any engorgement of the salivary glands.

Rabies in the ox, sheep, and swine, produces also phrenitic symptoms: the harmless sheep is changed into so ferocious an animal, that I have seen him butt at his own shadow reflected by the sun on a door. In sheep, the general appearances after death also resemble those usually present in the horse: it must, however, be remembered, that in no two cases of any animal whatever are they exactly similar; but in all, marks of violent and almost universal vascular action predominate. Mr. Youatt appears to consider inflammation of the glottis, epiglottis, and usually of the trachea also, as almost constant rabid post-mortem appearances in the various quadrupeds which he has examined. Inflammation of the stomachs, however, is not always present in the ruminants, though seldom absent in the horse.

Treatment.—Our efforts must be principally directed to a *preventive* plan; for nothing we yet know of will arrest the disease when it has actually appeared. When a bite has been received, first well wash the parts around the wound with soap and water; next wash the wound itself with the same made strong and well rubbed in. It would be well now to shave the hair, that any other lesser puncture might be detected. If the wound or wounds be deep or penetrating, dissect it or them wholly out; and if in the neighbourhood of important parts, as the eye, &c., apply afterwards any caustic matter. If it be where no danger is to be apprehended, apply the actual cautery, and which, in one small puncture, may alone be sufficient, taking care to allow it to reach to the bottom of the wound in either case. In a lacerated wound dissect *the whole superficies out, if possible,* and then apply caustic to the whole surface of the excavation. If the complete destruction of the inoculated part be effected, no fear need be entertained for the safety of the animal; but it is very difficult often to decide that no *other* bite has been received. Under such circumstances, any antidote at all, possessing but questionable efficacy, should be also given. I formerly had a great dependence on the *prophylactic* efficacy of the *buxus* or box; and I still think it deserves a full trial, according to the form in which it is administered in several of the midland counties, which is as follows:—

Box leaves (if possible, the tree box)	eight ounces
Rue	eight ounces.

Cut very fine, and boil in three pints of milk in a close vessel for one hour; then remove and strain off. Again boil the ingredients another hour in three pints of water; when again strain off, and mix the liquors. Of this mixture give a third every morning fasting. A *cow* may take the same quantity, and a *sheep* one third of it. In my *Canine Pathology* the subject of *rabies* is very fully considered, as regards its origin, symptoms, and treatment, whether under a view to its *cure* or its *prevention.* See also article "Rabies" in *The Veterinarian.*

THE BITE OF VENEMOUS REPTILES.

MANY of these, in warmer climates, inflict fatal wounds both on man and beast. In the East Indies, the cobra di capello will occasion death in the largest animal in a few minutes: fortunately we have none of the serpent tribe whose bite or sting is poisonous but the adder; which now and then wounds horses and oxen while grazing, and sometimes dogs in hunting. This accident is not often attended with fatal consequences; and country persons, as a remedial treatment, merely rub the part with an onion, and force another, mashed, down the throat. In more serious cases the following will give relief:

Spirit of hartshorn *(liquor of carbonated ammonia)*...	one ounce.
Olive oil..........	a pint.

Mix.

—To a horse, ox, or cow, the whole, to a sheep or large dog a third may be given, and some of the same may be well rubbed into the bitten part.

In case hartshorn cannot be procured, substitute oil of turpentine two ounces, or a double or treble quantity of any of the spirits, as brandy, rum, or gin. The stings of hornets, wasps, and bees, may be successfully washed with vinegar, or rubbed with the blue (indigo) used by washers, which is often found to be an instant specific.

VEGETABLE POISONS.

THE stomach of the horse is sensible to the deleterious effects of many of the narcotic and acrid stimulating vegetable matters, which prove destructive to the human. Of some of these, however, it takes an immoderate dose to seriously disturb the functions; of which opium is an instance among others: while a moderate dose of the prussic acid in the form of lauro cerasus kills him in a short time. The *taxus baccata*, or yew tree, is very poisonous to horses, stealing away life speedily, without raising convulsion or commotion. Digitalis purpurea, or foxglove; œnanthe crocata, or dropwort; phellandrium aquaticum, or water parsley; nicotiana, or tobacco, are hurtful; while conium maculatum, or hemlock, and cicuta viroso, or water hemlock, are reckoned poisonous by some, and innocuous by others. Vegetable narcotics appear to produce their effect, through the medium of the stomach, on the sensorium: the stomach, however, is found after death to bear but little marks of affection, nor are more to be perceived in the head: the lungs are found in many cases very highly inflamed. The more acrid vegetables leave very powerful marks of their ravages, by deep inflammatory spots over the villous surfaces of the stomach and intestines. In these cases we cannot hope to effect the removal of the noxious matter by vomits in the horse; but we may do it in the cow, sheep, or dog, by considerable doses of emetic tartar, or of white vitriol. We must therefore, in the horse, counteract the effects of such as are narcotic by active purgatives, as the croton nut; and also by a liberal use of acids and demulcents, as oil, butter, &c.: but in such cases a caution is necessary with regard to vinegar, which in doses of a pint has destroyed; half a pint may, however, in urgent cases, be safely given, or a drachm of oil of vitriol (*sulphuric acid*) may be infused in a pint of water, and poured down. However, if it can be procured, the stomach pump should supersede every other means.

MINERAL POISONS.

THESE act usually by their caustic quality on the coats of the stomach and bowels; but the horse is an animal whose power of resisting the effects of the more active mineral agents is remarkable; much of which capability is unquestionably dependent on so great a portion of his stomach being insensible. But there must be an inherent structural power in the other parts of the alimentary canal also to resist their effects, or otherwise how comes it that the caustic mineral acids do not, when they have passed the cuticular portion of the stomach —which they naturally do in common with other matter—how comes it that they do not then exert their baneful influence, except in quantities which bear no proportion to the mere bulk, or his general constitutional powers, compared either with man or other animals? Tartarised antimony (*emetic tartar*), to the amount of four ounces, creates little disturbance in the horse, and proportionate doses of its sulphuret (*crude antimony*) and oxyde (*antimonial powder*) are equally innocuous[*]. The acetate of lead can also be borne by the horse without disturbance in very large quantities: and although arsenic and the oxymuriate of quicksilver (*corrosive sublimate*), the acetate of copper (*verdigris*), cannot be borne in any thing like equal doses, yet quantities that would astonish the inexperienced are given every day medicinally.

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[*] It has been erroneously argued, that because a horse can bear this quantity of antimony, that therefore in moderate doses it must be inert. Analogy teaches us that repeated small doses of many articles effect that which one large dose cannot do; and fact fully evinces that the power of antimony in lessening vascular action is considerable.

The *symptoms* which arise from the imprudent[*] or malicious administration of the more common mineral acids do not materially differ. The horse is first observed to be uneasy and impatient, which ends in his lying down and rolling, or stamping with his feet, as in gripes: he also looks round at his sides in the same manner: so that these cases might be readily mistaken for colic, were it not for an appearance which is almost constant here, and is very rarely seen in spasmodic colic. This is the presence of a viscid, ropy, or frothy mucus, which continually escapes from the mouth, is singularly hot, and at length becomes fœtid to the smell. In some instances there are frequent attempts to stale and dung: now and then bloody evacuations pass. Profuse cold sweats break out: the weakness becomes extreme: the pulse, from the first quick and small, now intermits, and the animal sinks to rise no more.

Dissections of these cases, as far as I have observed them or been informed of, do not always present appearances commensurate with the violence of the symptoms. In some, the whole alimentary canal has presented gangrenous and sphacelated portions of great extent, when the sufferings were not apparently intense, and where even hopes were entertained of amendment. In others, spots of an inflammatory hue have been dispersed over the villous surfaces of the stomach and intestines, at considerable distances from each other; and yet the sufferings during the disease were extreme.

No *treatment* we can offer promises much, for a veil is commonly drawn over the case; and when otherwise, the time usually lost before assistance is sought for precludes much hope. If an early application be made, and a stomach pump be at hand, it ought to be at once employed: but under other circumstances our efforts should be first directed to dilute the poisonous matter, and then to weaken its potency. Alkalies have been supposed the best means to fulfil the second intention, as an ounce of potash in thin gruel. Orfila, however, recommends in these cases, particularly such as arise from corrosive sublimate, entangling the poisonous matter in the albuminous (i. e. the white) matter of eggs. Back-rake, clyster largely, and otherwise act as the symptoms direct.

LOCAL INFLAMMATION.

THE *principles and doctrine of inflammation* have been so fully treated on at the commencement of the Pathology, under the head *General Inflammation*, that we shall only introduce the practical inferences to be drawn therefrom, with such particular observations as immediately connect it with the *surgical* part of our subject. A very attentive consideration of these principles is necessary to a successful practice of horse surgery, as many, nay most, of the local and external diseases of the animal have their foundation in inflammation.

Local inflammation is characterised by heat, redness, tension, or swelling, and by pain or tenderness in the part affected. According as such inflammation is considerable or inconsiderable, the circulating system universally participates, or it is unaffected. The general circulation is also affected or not affected, according to circumstances connected with the structure and functions of the inflamed part.

When the general circulation is increased, the horse is said to have *symptomatic fever;* but in every instance the vessels of the inflamed part are in a state of distention[†] or swelling. The *tumid* state of the part in inflammation is a well known symptom, and, as connected with our immediate subject, is dependent on the distended state of the vessels themselves; to which is sometimes superadded, an effusion or pouring out of the contents of these vessels; in which, either the serous parts of the blood, or when the inflammatory action is very considerable, coagulable lymph, or as it is now called the fibrin of the blood, is effused into the cellular tissues; and which further increases the tension, and embarrasses the recovery (see *Tumour*). .Thus the effects and terminations of local inflammation are varied according to the nature of the part, the state of the patient, and the violence of the attack. If the inflamed vessels be enabled to reinstate themselves by getting rid of the distending column of blood within them, and of recovering their tone and contractility, *resolution* takes place. But when this does not occur, and the same vessels have poured forth the coagulable part of the serum, a more protracted process is usually necessary to the cure. But that effusion which in spontaneous inflammation would protract the cure, in healthy inflammation consequent to abrasion, incision, laceration, &c. formed of the coagulable or albuminous part of the serum, and thus poured forth, is the very pabulum for the new formed parts, and the cement by which the breaches are to be repaired. This inflammatory effect is called *adhesion*. If the morbid attack be still more active, or longer protracted, or if extensive injury have been done to the surrounding parts by pressure, laceration, &c., then the same vessels, instead of the albuminous part of the blood, secrete from it a homogeneous fluid called *pus* or matter, with which process ulceration or lymphatic agency in the absorption of the surrounding edges is united; and these actions are called *suppuration*. Occasions will, however, occur when the inflammatory action is inordinately violent; or when it is long protracted; or when it occurs in a constitution generally debilitated; or when a part has suffered great accidental violence: in any of which states, the inflammatory congestion may rupture the vessels, and destroy them, and the effused blood putrefying in and around them, *sphacelus*, *gangrene*, or *mortification*, is said to have come on.

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[*] By the term imprudent, I mean the continued administration of even moderate doses, without carefully watching their effects, and of occasional cessations from the administrations of them: for it is remarkable, that a horse will continue to take 30 or 40 grains daily of the most potent of these, without apparent ill effect. All at once, however, symptoms arise, and consequences ensue, as though the united quantities he has taken had been given at once.—(See *Treatment of Farcy.*)

[†] It seems doubtful whether an inflamed part is always in a state of increased strength. On the contrary, it may, under some circumstances, be considered as in a state of increased debility; for the inflammatory action, particularly of the larger arterial trunks, may carry the distention of the capillary branches beyond their contractile power to overcome; or, what is equally likely, it may altogether stop the nervous influence by which these vessels are acted on; in both these ways debility may be the consequence of long-continued or inordinate distention. These views of the matter are very important in practice, and deserve the most attentive examination and consideration: as on a correct judgment formed of the one or the other of these as the immediate cause, our prognosis as well as our practice will much depend.

The *treatment of local inflammation* must be varied according as the tendency to these different kinds of termination exists; but when it is in our power, there are but few instances in which we should not choose the termination by *resolution*; the first indication to produce which is, to restore and equalize the balance of power between the parts; and this must be done either by bringing the system at large down to the level of the affected parts, or to raise the tone of the inflamed parts to the level of the system. The former is only to be attempted when the general plethora is very great; in which case we make use of general bleeding, purges, and diuretics (see *Diffused Inflammation*). In most instances, however, topical bleeding is to be preferred, where it can be practised, by which the distended vessels are at once freed from their load. When blood cannot be drawn from the immediate part, still it is often practicable to open a vein in the neighbourhood of it, which shall return the blood from that individual part immediately. In violent local inflammations, both topical and general bleeding may be usefully employed at the same time. *Topical applications* are among our most active agents in dispelling local inflammations. In phlegmonous inflammations particularly, cold powerfully promotes resolution, and also in the inflammatory actions which follow those injuries known by the name of strains; which it is probable is effected by its action on the caliber of the vessels, and thus reducing the distention. With the coldest water mix the acetate of lead (see *Vet. Pharm.*), and renew the application frequently in the wettest state, by which means constant evaporation will decrease the temperature still lower. Or a still colder application may be formed from the muriate of ammonia with vinegar (see *Vet. Pharm.*). As cold proves itself an active agent in some local inflammations, so also heat, or rather warmth, in many other cases, proves no less so. It is in vain to theorize on the seeming incongruity of curing the same disease by two such opposites: the facts are so, and all the theoretic arguments in the world cannot overturn them. In many cases, therefore, we reap the most decided advantages from the use of warmth, in the form of poultices or fomentations, which appear to act by unloading the vessels of the part in the form of sweat or exhalation: but as actual heat increases inflammatory action, and therefore promotes other termination than resolution, we should be careful to avoid applying either of these means too hot. On the other hand, as in these immediate instances cold would prove injurious, so we should be careful in the use of fomentations, that we do not leave the part afterwards wet and exposed, otherwise cold will be generated by evaporation (see *Poultices and Embrocations, Vet. Pharm.*). For these reasons a moderately warm poultice frequently applied becomes, in many cases, one of the best applications in promoting resolution, and perhaps it is peculiarly eligible when the inflammation is some way removed from the surface, as it tends to unload the vessels near the part, with little addition to their temperature. When the inflammation is situated still deeper, we frequently use rubefacients or actual blisters, which create an artificial metastasis (see *General Inflammation and Blisters*). But when, notwithstanding all our efforts, the tension, heat, and tenderness of the part increase, suppuration will take place.

When *suppuration* becomes unavoidable, it is then our duty no longer to attempt to retard, but on the contrary we should promote it, to prevent the worse termination (by a continued irritation and debility) into gangrene. If the inflammation have been confined to a mucous surface, we may expect the transition to take place without trouble, these surfaces changing their secretions from a mucous into a puriform fluid, without great increase of effort. If the inflammation be situated within the cellular membrane of the integuments, or the muscular tissues, &c. &c., more active symptoms will supervene. The heat and pain may lessen, but the actual sensibility of the part will commonly be augmented. It must be our care now to avoid depleting the system; a moderate warmth should be constantly applied to the part by means of warm poultices. Should the suppuration be deep seated, or when it becomes prudent to hasten the maturation, solid turpentine may be added to the poultices, and which poultices should be frequently renewed. Almost constant fomentation might possibly be better, as renewing the heat oftener; but in these cases the part must, for reasons already stated, never be suffered to cool, by remaining uncovered, nor be left wet. When neither poultices nor fomentations can be used, the part should still be kept warm by means of an adhesive plaster over it, or with cloths; or it may be thickly greased over, which promotes heat, and prevents the effects of evaporation. In this state it is still to be remembered, that if the general action of the system should be very inordinate, it is to be repressed; otherwise the inflamed parts may, instead of falling into a healthy suppuration, be hurried, in the end, to such debility as will produce an entire loss of their tone, when mortification must ensue. When suppuration has been long continued, sometimes the vessels become so habituated to the action, that it is not easy to promote a healing process: in this case setons and rowels are introduced, to promote a new action.

Mortification.—When the congestion in the capillaries is extreme, or when debility to a great degree takes place in a part under inflammation, it falls into mortification. If the adjacent parts likewise are equally debile*, they frequently participate, and become gangrenous also; but if they are strong, the absorbents are equal to the removal of the edges of the sound part, and by this means a separation of the dead from the living takes place. It is, therefore, our duty to prevent this extension of death to the sound part, and to promote the removal of the dead from the living. To effect this, we must attend to the system generally, as much as to the parts individually, for upon a salutary effort of the constitution at large we are principally to hope for this; particularly when the inflammation is extensive or deep seated. Constitutional remedies are peculiarly available, because the immediate parts are already dead, and no topical applications can restore them: the *constitutional* means of this nature are such as tend

* Mortification is likewise consequent to a defect in the nervous influence which should be distributed to the vessels, and which defect may arise either from a morbid cause acting on the nervous trunk which feeds the part, or on the fibrillæ by which such influence should be distributed: thus a paralytic limb becomes cold, and often mortifies without much apparent vascular action.

to moderate arterial action, if it yet remain inordinate, without producing debility or exhaustion. These ends are best fulfilled by nitrous or vitriolic æther; and the liquor ammoniæ acetatis (*Med. Pharm.*). If the debility be already extreme, we must employ more active tonics, as bark, opium, camphor, &c., with malt, ale, and gruel, as beverages. With regard to medicinal tonics and cordials, they should be administered in small quantities, but frequently, that their action may be uniform and permanent, and at the same time not inordinate. Local applications are to be made use of also, not with a view to restore the parts already dead, but to prevent the spreading of the evil, and to assist the separation of the sound from the unsound. The fermenting poultice is a useful application (see *Poultices*); and occasionally the parts may be washed with the muriate of ammonia and vinegar. Scarifications are not to be recommended, for they only reduce the living parts into the same state as the dead ones.—We shall now proceed to apply these doctrines to a consideration of the several subjects of *wounds*, *ulcers*, *tumours*, inflammatory, indurated, and encysted, and to that inflammation, both healthy and diseased, which affects the bones.

CLASS XI.

WOUNDS.

A WOUND is a solution of continuity, or a division of some of the parts of the body; and as wounds frequently occur to all the animals domesticated to our use, it becomes a matter of great importance for the veterinarian to be equal to the treatment of them. The surgical treatment of wounds differs in the horse and other domestic animals from the human, from peculiarities in the constitution; but principally it differs in the *mechanical* parts of the treatment: therefore *veterinary* surgery cannot be perfectly learned from the most intimate acquaintance with the practice of *human* surgery. A wound occurring in any of the subjects of our care, should be treated according to the particular circumstances which take place, as the nature of the wound, the part in which it happens, as well as the immediate structure of the substance divided, and the constitution and habits of the animal. When a wound occurs, it undergoes several states before the part is again made whole: hemorrhage first takes place, which if very considerable must be immediately attended to. It is, however, to be remembered, that the vital resources are so much greater in the horse, that the division of an artery which in the human would require pressure to stop the flow, in the horse may be allowed to remain unattended to; and that when nothing but taking up a human artery can secure life, moderate pressure will be sufficient in veterinary practice. When, however, a very large artery is divided, it should be secured with a tenaculum, if possible; or if not practicable by these means, a ligature should be passed around it of fine strong silk (see *Wounds of the Arteries*). The next circumstance to attend to is, the removal of any extraneous matter which may have insinuated itself; and if this can be done without washing the cavity, the chances of early union will be increased. But when dirt, dust, &c., render washing out the wound absolutely necessary, tepid water is all that is requisite. All powerfully stimulating applications, unless to a contused wound, are, in most cases, hurtful, and always act against an immediate union. We, on the contrary, hope to gain a prompt union by the medium of the albuminous part of the serum which is poured out in these cases; 'and which Mr. Hunter called *union by the first intention*:' supposing, however, that such union was not that of the two parts to each other, 'but the union of the broken parts to the intermediate extravasated blood.' Modern surgery defines it to be brought about by the vessels of each side of the wound inosculating with each other: the divided vessels, having first poured forth their adhesive coagula, prolong themselves through the extravasated matter by their own vitality, the adhesive fluid gluing the surfaces, as the inosculating vessels interlace and dovetail the union.

Some veterinarians deny that this union ever takes place in the horse; but which is certainly erroneous. I have seen many instances to the contrary; and although the force of the arterial circulation in the horse usually hurries on the suppurative process, yet it is more owing to the difficulty arising from his restlessness in maintaining an approximation of the wounded surfaces together than to any constitutional speciality, that it does not more frequently happen. It is, therefore, the duty of every veterinary practitioner to endeavour to promote the adhesive union by a perfect adaptation of the sides of the wound together, and by a careful retention of them in this situation. In any wound beyond the most superficial, assistance, is derived from the use of sutures: with them, however, we cannot always succeed; but without them we have still less chance.

Sutures are stitches made in a wound with needles, armed with either silk, cotton, thread, worsted, or fine tape; and the arming is of the filamentary or thread-like matters: it it usually many times doubled, that it may not cut the parts, and is also waxed to increase its tenacity. There used to be many kinds of sutures, but modern surgery has reduced the number to three; at least, the interrupted, the twisted, and the glovers, are those principally in use: of which the first is by much the most useful and general in its application. The *interrupted* suture is nothing more than an indefinite number of distinct stitches unconnected by the threads with which they are made. For deep wounds, and for such where the substance of the integuments is to be brought into union, the needles used are curved, with their substance somewhat flattened, which form best adapts itself to the penetrating of the substance of the divided edges of such wounds*; the lips of which having been cleansed from clots of blood, or any extraneous matter, should be carefully brought together in exact opposition: but unless there be danger of dirt, or other extraneous substance intervening, much washing or wetting the part had better be avoided. The needle properly armed, is now to be carried from without, inwards, to a sufficient depth to prevent the ligature tearing away the flesh; when having penetrated one lip carry the needle through the other, from within outward. Cut it away from its ligature, which leave untied; again thread or arm it, and if more stitches be required, repeat the operation in the same manner for each stitch, the distances of which from each other must be regulated by circumstances, as the depth of the wound, its being exposed to much or little motion, &c. I have seldom, in wounds of the integuments, found it advisable to put them nearer than an inch to each other; but oftener I have allowed an inch and a half or two inches between each. Having inserted as many stitches as are requisite to sustain the parts in their just position, begin to tie each ligature, an assistant carefully holding the edges of the wound together; bearing in mind that, if the wound be considerable, it is prudent to fasten the centre stitches first. The disposition that is observed to ulceration in the horse and other quadrupeds, greatly lessens the advantages which are often derived from sutures in the human subject. It is very seldom that the veterinarian can depend on any suture remaining beyond the third or fourth day, after which it ulcerates out, and more particularly, I have observed, where the stitches have been drawn too tight: in my own practice, therefore, I always avoided it, being confident that it greatly increases the inflammation, and hurries it on to ulceration.

To obviate this inconvenience to the stitches it is important to add to the sutures the assistance derived from adhesive plaister made from resin, pitch, or cobbler's wax, and spread on leather, strips of which should be passed across the edges of the wound (previously shaved or shorn), of sufficient extent to reach beyond the exuding moisture, the whole being secured by a proper bandage. Wherever the uniformity of the part will allow it, the bandage in human surgery called the *uniting* is the best, which consists of a long roller having two heads or rolls, by which means the central part can be first applied to the portion of limb or body opposite to the wound; by then drawing each roll forward, the divided edges are brought into contact by the pressure, and the completion of the bandage will retain them there. The conical form of some parts of the extremities will, in some measure, prevent the permanent application of any bandage, unless retained in its situation by supporting ends passed in the fore legs over the shoulders, and over the loins for the hinder. This form of suture is applicable to most wounds, and is even now practised on the intestines in lieu of the glover's suture, which having been thought to pucker the wound and increase the inflammation, has been brought into disrepute. (See *Wounds of the Intestines.*)—The *twisted suture*, though popular in human surgery, is not frequently applicable to the horse. I have however occasionally used it; and think that in wounds of the eyelids, lips, nostrils, &c., it may, in some cases, be advantageously employed*.—The *glover's* suture, as before observed, is in disrepute; and though still used by many older surgeons, is certainly superseded by the interrupted, which, it has been found, is fully equal to producing adhesion in the intestines and other thin membranous cavities. All straight surgical needles are made with a triangular cutting edge, which greatly assists their entrance into the substance of a wound, particularly of membranous parts. It still, however, remains a doubt, whether the irritation occasioned by stitches or ligature does not sometimes rather retard than promote the adhesive union: and yet it is principally as a promoter of this union that they are advisable, but it being seldom that the ulcerative process allows them to remain beyond the third, fourth, or fifth day, at the utmost; at which time the inosculation of vessels being not firm, the part usually again divides, and must then be filled up by *granulations:* neither is it unusual for the irritation of the wound to occasion the horse to rub or bite them out before even this time, unless both horse and wound be very carefully secured. It is also necessary to remark, that in some cases, particularly where any foreign body has been incautiously allowed to remain within a wound, the irritation becomes so great that it is prudent to divide the stitches, which will sometimes give immediate relief: and the same occurs often when the mere inflammation of the part runs high. Here, therefore, are evils and benefits mixed up, the selection of which must depend on the nature of the case.

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* The veterinarian may furnish himself with these needles of various sizes, degrees of curvature, &c., at the shop of the late Mr. Long, High Holborn.

The *adhesive inflammation* may, however, and certainly does in some cases, appear to be promoted by the judicious use of sutures: in all wounds it is clearly our duty to attempt the present or future union, by a close application of the divided parts to each other, but we must then be guided by circumstances as to the best method of retaining them so applied until structural union binds them indissolubly. The adhesive union will be also greatly promoted by moderating the inflammatory tendency which may be expected to arise from an extensive wound, by general bleeding, low diet, cool temperature, &c.: but it is proper to remark, that until this union be despaired of, no moist applications should be applied.

Suppurative process.—When the adhesive union cannot be brought about, a greater inflammatory action takes place in the part; it tumefies, becomes hard, painful, and tender, and a thin fluid is poured out; to which succeeds either death in some of the parts (see *Gangrene*), or more frequently the fluid formed becomes purulent. The secretion of pus is usually followed by a cessation of the inflammatory symptoms, and is succeeded by a formation of granulations, to which the suppurative process seems essential; and as they rise, the chasm is gradually diminished until, reaching the surface, *exsiccation* of the part takes place, and the cutis is formed over it.—*Cicatrization* is the process of forming new skin, but which is never so ample as before, by which means the surface or scar of an extensive wound is puckered. It also becomes hard and ligamentous when fully formed, though at first it is thin, very vascular, and highly sensible;

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* When I was in Holland, acting as surgeon to the 40th Regiment of Foot, I was requested by a field officer to look at a valuable charger which had the right nostril divided by a sabre wound, and which had penetrated through the lip into the mouth. I conceived the project of retaining these parts in their situation by means of needles, which I supposed, as being thin, were not so likely to ulcerate out; and the event justified my view of the matter.

to the formation of skin prevents the growth of hair, if the injury have not been extensive; but if it have, this is not required. In the process of forming granulations the wound should be kept from exposure, but the applications used should be simple; for whatever is applied, is more for the purpose of defending the part than from any peculiar operation on the sore. Great stress was, by the older farriers, laid on healing ointments, oils, digestives, and innumerable others. Modern surgery has discarded many of these; but as occurs in other improvements, in correcting an evil, too much has been attempted probably: for experience shows us, that it is not equally indifferent to every wound what is applied to it. I have seen an [illegible] that would bear no application with comfort but the old compound called basilicon, the yellow, which is so little different [illegible]. Many applications certainly promote a formation of granulations, as all the terebinthinated: but these are seldom necessary, for in the horse the flesh is apt to spread too fast, except in very deep wounds, or those of particular parts, in which instances we cannot promote their growth too much by means of such terebinthinated stimulants, by tincture of aloes with myrrh, &c. &c. In other cases of luxuriant growth, applications called detersive, as ointments of calamine, or zincum, &c. &c., are proper, as they deterge without promoting the too rapid growth of parts. When the granulations have extended beyond the level surface of a healthy part, they may be deemed diseased, and the wound will never heal while they remain so; on the contrary, it frequently enlarges: for the pressure the luxuriant granulations make on the edges produces an absorption of the healthy parts, and thus increases the surface of the sore. This luxuriance must, therefore, be kept down by mild *escharotics*. (See *Mat. Med.*) The firing-iron is often an excellent means.

It is the practice of many farriers to plug every wound with something of the nature of a *tent*, under an idea of keeping it properly open, by which the healthy processes of nature are frustrated, and simple wounds are rendered complicated and tedious, by this introduction of tow, sponge, candle, &c. &c. In this way also sinuses form, and the edges of the wounds, by being in constant contact with *foreign* bodies, become hardened and callous, and are for ever incapable of union until they are removed either by caustic or the knife. The only circumstances that can justify the use of tents are, where a very deep wound exists, with a very small orifice; in which case it is certainly not prudent to permit the external opening to heal until the granulations have filled the cavity from the bottom; likewise when any extraneous body is suspected to be within a wound, as thorns, splinters, gravel, &c., or when a bone has been injured, in which case its exfoliation being slow, if the muscular parts healed up, the exfoliating bone would become a foreign body, and occasion continued irritation and repeated new abscesses. In such cases of protracted suppuration, we have a powerful auxiliary in *rowels*; and which, in full plethoric horses, may be likewise inserted in every case of extensive local injury, as near the wounded part as is convenient, by which the inordinate action will be greatly checked. But when, on the contrary, from the nature of the wound, the peculiar circumstances of the patient, &c., the action of the parts is really below the ordinary standard, stimulating applications must be made use of. Among which, warm fomentations stand foremost, assisted by terebinthinated dressings, or by pledgets dipped in tincture of myrrh with aloes, or the tincture of benjamin (called Friar's balsam): or one part of oil of turpentine with three parts of olive oil will answer the end. But it is only on such occasions that these applications are necessary, and only in those particular cases before noted that tents can ever be at all proper; for it should never be lost sight of, that it is our business to watch and assist Nature, and not to interrupt her; and it will always be better to leave her to herself, than to interfere injudiciously, which it is the express intention of these instructions to prevent.

WOUNDS OF PARTICULAR PARTS.

Wounds of the head should be treated according to the part they happen in: in most cases, the first step is to ascertain whether any injury has been done to the bones underneath, which, if found to be broken, must be treated by such means as are directed under Fractures. When any part of the *ear* is much lacerated, it may be advisable to remove the whole ear and its fellow. I have, however, succeeded by fine sutures and supporting the tube internally, in maintaining a shapeable ear; and which, as cropping is now out of fashion, may always be attempted, as we have still the other as a later resource. When, from accident, either the *parotid* or other *salivary glands* become wounded, every attempt should be made to produce a speedy union, or the continued flow of saliva will occasion a fistulous sore.—(See *Salivary Fistulæ*, Class XII.) In wounds of the *eye*, or of the *eyelids*, the parts should be replaced as critically opposed as possible, having in view their future functions, so that their motions may not be impeded: in such cases, it is evident no irritating application ought to be used; but that every means should be made use of to avoid inflammation. In divisions of the eyelid, neat small stitches of the interrupted suture may be inserted near together, and the horse secured from rubbing, by placing him in a box or barn, with his head tied to a beam in the ceiling, at the usual height, by which means he cannot rub the wound with his knee or his hind leg; nor will there be any rack or manger to rub against: he should also have a cradle constantly on his neck. I have, in one or two instances of wounded eyelids, used the twisted suture with success. (See *Sutures.*) In wounds of the *nose*, care should be taken to replace the bones if any be displaced, and to retain them in their situation, by the putting any firm substance up the nostril well guarded with soft tow or rag; or the fingers may be used if they can reach so high, and the external wound should be afterwards closed to prevent the unnatural access of the air.

Wounds of the neck.—When the suspensory ligament becomes wounded, a depending orifice should be immediately made, and the wound dressed with terebinthinated or other warm applications, by which the ligamentous substance may be stimulated into an healthy inflammation, and sinuses prevented from forming. (See *Poll Evil.*) When the œsophagus is divided, treat as directed under *Œsophagotomy:* and if the trachea have suffered in the same way, refer to the treatment under *Bronchotomy*. The integuments of the neck are not unfavourably situated for the insertion of interrupted sutures; but to prevent their being rubbed out, a neck cradle should be worn, and the horse's head should be racked up to the manger day and night. When it is necessary to perform operations in the neck, by dilating an already existing wound, the longitudinal direction of the muscular fibres should direct the section, and due regard should also be paid to the nerves and bloodvessels around.

Wounds of the chest, when they take place in the muscular and integumental parts of the chest, must be treated like other external wounds; but when they penetrate the cavity, the treatment must be regulated by the extent of the injury, and the nature of the parts penetrated. When the lungs are punctured, the danger is always great; for should the hæmorrhage not destroy, fatal inflammation is likely to follow. These wounds are distinguished by the air rushing out at the wound, and by the scarlet hue of the hæmorrhage. Having ascertained that no foreign substance is left within the thorax, carefully close the wound by any of the means already directed, enveloping the chest in a circular bandage. From the consequences which usually result from openings made into any of the visceral cavities, it is expedient to close such as speedily as possible; and therefore, where no other circumstances interfere to prevent it, as wounding a viscus, and where the figure of the wound will admit, no means are more simple, ready, or efficacious than the firing-iron. In wounds of the chest a principal indication is, that the force of the circulation must be also immediately restrained by copious bleeding; and if blood becomes effused into the cavity of the chest, it should be suffered to escape by the opening already made; and if it will not do this, the operation for empyema must be performed. (See *Dropsy of the Chest*). If emphysematous swellings take place in the parts around the opening, which may be known by the crackling noise and peculiar feel they will be accompanied with, the extravasated air should be let out by small punctures with a lancet. (See *Extravasation* and *Emphysema*).

Ruptured diaphragm.—A lesion of this important muscular septum is a more frequent termination of the life of many horses than is supposed; and appears to be the finale of broken-winded ones particularly, when pressed beyond their powers. It has also happened by the violent abdominal contractions in foaling, or other great and inordinate efforts. Death, of course, is a speedy and inevitable consequence.

Wounds of the abdomen.—These, when external, must be treated after the manner of wounds in general, observing that if it be simple puncture or stab of the mere cavity only, and that none of the viscera be wounded, and no protrusion of parts occur at first, that no means are more likely to shut up the opening effectually than the budding-iron applied to the integumental lips of the wound, and to those only. But when the cavity has been more deeply penetrated, and there is reason to fear that some viscus is injured, the treatment must consequently be rendered more complex, and the danger proportionate: when such a wound has occurred, the extent of it should be carefully examined, that we may learn what viscera are likely to be injured; in which examination we shall be aided much by a previous knowledge of the different *regions*, as already taught, and the viscera that occupy them. (See *Splanchnology*, p. 212). If any of these be protruded, carefully replace them; unless they should have become mortified or frozen, in which case remove the injured and replace the sound part. When the intestines are wounded, the opening of the gut must be neatly united by suture. (See *Sutures*). It has been recommended, in case the external wound be large, to stitch the intestine to it, in preference to letting it float loose in the abdomen, which, as will be again noticed, particular circumstances may render eligible. When an intestine is completely divided, the chances of union are small; nevertheless, I should not hesitate to invaginate one portion within the other; when, fastening them with suture, I would return them into the abdomen. The external wound may, if possible, be drawn together by sutures, but much more dependence is to be placed on a firm supporting bandage. For forty-eight hours offer neither food nor drink, and then only thick gruel in small quantities; and if the wound be in the small intestines, apply wet cloths around the body instead of drink, and nutritious clysters instead of food by the mouth; employing bleeding as a means to combat irritation and fever. Sometimes, from very large openings made in the abdomen by staking, or from the gores of oxen, there follows an extensive protrusion of parts, which will often require much force and more dexterity to return. I have first placed close to the wound a very firm bandage already drawn moderately tight, and then have replaced the parts with my fingers under it, gradually drawing the bandage onwards as I returned them: the integuments should, in such case, be carefully and firmly sewn up, and an adhesive plaister placed over all, to keep a permanent pressure on the protruding portions. The internal state of the bowels also should be particularly attended to, that they may never be distended; for this purpose, food should be at first withheld, or given very sparingly in a liquid form only; but nutritive clysters may be more freely administered. It likewise happens, that with all the efforts we can make, the parts cannot sometimes be returned; or it occurs that by long exposure they may have become sphacelated and unfit to be returned; in which cases, what is to be done? If the bowels protrude, and the return is totally impracticable from flatus, but that they are not gangrenous, it is prudent to minutely puncture them; and I prefer this to any attempts at enlarging a very small abdominal opening, as is too frequently done; but which almost always gives passage to a still larger quantity of intestines, equal to eventeration, and which no future efforts can replace. The *return* must be attempted by means already mentioned, or by the fingers of one hand gently introducing portions of the intestines within one side of the opening, while the other hand is employed in sustaining the portion introduced; an assistant supporting and gently pressing on the remainder: all this is best done with the animal cast and placed on his back when the eventeration is considerable. Having returned it, if the opening be a defined one, and not immoderate, it should be stitched up with cross sutures. When extensive injury has been sustained by the intestine, and the discolouration shews that sphacelus has proceeded, excise the mortified portion, and sew the edges to the external wound in the abdominal parietes. If omentum have protruded, by all means excise it if discoloured from strangulation; and do the same when it is too tumid to return. In all such cases it is evident that a well-informed practitioner is left greatly to his own resources: but the knowledge that the animal must die without assistance, will embolden his practice; and the recollection that greater liberties may be taken in brute than in human surgery, will give a wider field to his exertions, and enlarge his chances of success. Wounds of the abdominal viscera are not, of necessity, fatal, and large portions of most of them have been excised at these times, or lost by mortification, without destroying life. The omentum particularly has suffered excision of large portions with impunity: considerable portions of intestine have also been cut away, and being stitched up in various ways, but leaving the integrity of the tube entire, the resources of nature have saved the animal. In other cases, fastening an opening so made to the abdominal parietes has made a temporary anus, but which the same animal resources have at length closed up, and have by re-establishing an internal continuous canal, at length resumed the use of the old one.

WOUNDS OF ARTICULAR AND BURSAL CAVITIES.

THE ruinous effects of these wounds to horses render a due knowledge of the nature of the parts they injure, the consequences that ensue therefrom, and the curative means the most likely to obviate their effects, most imperative on every veterinarian. Neither, in the whole round of the art is there a subject that will afford a more striking display between the well-informed practitioner and the ignorant pretender than this; which has been well exemplified by the fortunate issues which now occur in very desperate cases; and by a comparison between those attempted by a mild treatment compared with the sad results which formerly occurred from one which was too often marked not more by its fatal termination than by the tortures inflicted under it. The frequency of these occurrences, the fatality of their consequences, and the erroneous practices pursued, made it a judicious choice in Professor Coleman when he selected this subject for the first number of *The Veterinary Transactions*. Of the method of treating it, as there displayed, it is not too much to say, that it would, even in our advanced state of knowledge, be considered a masterly performance; but as the art then stood with us, it fills us with admiration, but unfortunately, mingled with regret, that it should have been at once the alpha and omega of such a writer. My anatomical detail is replete with notices of vascular secreting membranes which pour out fluids on surfaces or within sacs, appropriate in qualities to the several parts they furnish. The membranes which line the cavities of joints and of the bursæ mucosæ thus secrete a semioleaginous mucus or glair, known popularly as *joint-oil*, which is of the most slippery nature, and admirably formed to resist the effects of friction. To secrete this in constant and due quantities, it is necessary that the membrane should be very vascular; we cannot, therefore be surprised at the great irritation which occurs on so vascular, so sensitive, and so extensive a surface as an open joint, when it becomes exposed to the action of the external air*; and when to this we add the effects of attrition between the ends of the bones, or between the sides of tendons and their sheaths, and between ligaments and their connexions, we recognise in a union of these a sufficient cause for those violent symptoms which arise and are commonly seen to accompany broken knees, punctured hocks, or even the accidental or purposed opening of a bursal capsule or *wind-gall* as it is termed[*]. If the simple effects of attrition, and the exposure of the secreting membrane which lines these cavities, is of itself sufficient to create a symptomatic fever that will endanger life, or sufficient irritation to produce tetanus, how much more certainly are these consequences to be dreaded, when to the effects of the accident are added the injection of the most acrid substances within a cavity already inflamed by exposure; and yet this was the practice formerly, and the event, as might be expected, was usually accompanied either with a train of fatal symptoms, or at best there followed a complete anchylosed joint; and the knacker was called in to hide the error of the farrier, and end the misery of his patient.

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* I am aware that it is doubted whether the introduction of air within cavities is the source of such irritation, and some experiments have seemed to favour this denial; but a greater number of others, and the usual result of these openings, give reason to suppose that the action of the air is prejudicial: at least we are certain that the entrance of air is a measure of the exposure of the cavity, and we may use it as such at least.

The *articular cavities* most subject to exposure are those of the scapula with the humerus or shoulder joint; of the knee; of the pasterns, before and behind; of the stifle; and of the hock: of all which the knee is the most liable to this injury. Of the *bursæ mucosæ*, poll-evil sometimes opens important ones; the semi-cartilaginous cap of the flexor radialis anticus, which runs over the point of the shoulder, furnishes another whose cavity, when exposed, is apt to be mistaken for an opening into the shoulder joint (see p 253). The elbow presents others also: a considerable one is situated behind the knee, and lesser ones are found belonging to the various ligaments and tendons which surround the knee; an opening into which is sometimes mistaken for one made into the great articular cavity. The thecal sheaths of the flexor tendons or back sinews are bursal sacs; large ones furnish the pasterns before and behind, whose dilatations are called windgalls. A bursal cavity, which is sometimes exposed by disease as well as accident, is that furnished between the navicular bone and tendo-perforans. *Behind*, we find bursæ in the stifle: the point of the hock presents one sufficiently known, as being the seat of a dilatation called capped-hock, and around this joint, as around the knee, individual bursal cavities exist also.

The *symptoms*, *progress*, and *consequences* of openings made into these cavities as regards the first are nearly the same; they differ only in degree: the progress and consequences are likely to vary according to circumstances. I shall take a general view of the whole, and then individualize particular cases that require such notice; for it is on broad principles and under general views, that the practitioner is best taught. An opening is made into these cavities by falls, by blows, by stabs, or punctures often inflicted by the action of kicking, &c. &c.; and these cases appear in the form of a simple incised wound, or as a lacerated one; or as one mixed with contusion, &c.; but in whatever way it happens, such inflammation takes place as first increases the synovial secretion, which thus increased, would force its way out of the cavity, even without the aid of gravitation or motion: how much more certainly, therefore, must it appear with these aids. Its presence is detected by the glairy white-of-egg-like appearance of the exuding moisture[†]; which if the escape takes place immediately, may not be considerable, the flow depending much on gravitation or motion; it may possibly also, in this early stage, have some blood mixed with it. If that, according as the degree of inflammation which ensues, is moderate or is intense, so either will the synovia continue to flow at first in somewhat increased quantities, but still in its original state of mucus, until the adhesive inflammation around, by forming a cement over the orifice, will stop the flow, and a cicatrix will establish the full integrity of the cavity. Or otherwise, the intensity of the inflammatory process will convert the synovial secretion into one, first muco-serous, next bloody and muco-purulent, until the synovial membrane being destroyed, the cartilaginous articular surfaces, if it be a joint, are absorbed; the denuded bones inflame, and ossific accretion forms a complete anchylosis; or the horse sinks previously by the symptomatic disturbance in the system generally.

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[*] We must again remark, that we ought not to confine our notions of the dangers resulting from open cavities to broken knees or wounds of the hock; on the contrary, we shall find that the opening of any of the bursal cavities produces similar effects, and equally requires the most prompt and judicious treatment: the opening of a windgall has occasioned death; and the common result has been an anchylosed joint. Within they are filled with a mucus as necessary as that of the joints; and their secreting membranes are equally vascular, frequently very extensive, as in those of the hock, knee, and pastern, where there are also not only individual thecal sheaths to individual tendons and ligaments, but frequently circumscribing ones, which envelop several ligamentary and tendinous attachments, within one common cavity: an opening into any of which is productive of the same local irritation, and the same disturbance of the system generally as would result from the exposure of a joint.

[†] Very young practitioners sometimes find a difficulty in distinguishing an open joint from a badly lacerated wound of the integuments, particularly where the synovial opening is minute; but a little attention will detect the smallest quantity of it, from its yellow tinge, glib smooth feel, and its general resemblance to the albuminous glair of an egg in colour and consistence. The junior practitioner is exposed to the danger of another mistake, which may arise from the accidental division of some mucous capsule surrounding a tendon, inserted into the circumference of the joint, and which he may mistake for the cavity of the joint itself. This latter error is more particularly likely to happen to the knee, to the shoulder-joint, and to the hock, where mucous capsules are so numerous.

Treatment.—When an accident has laid open an articular or a bursal cavity, the exposure of the surface, together with the escape of the synovia,* will excite *a very high degree of inflammation.* In such case, the grand indication of cure is *to close the opening made as quickly as possible*, which by restoring the integrity of the cavity, and stopping the synovial discharge, will arrest the *morbid* inflammatory action, and place the parts in a state for a healthy restoration throughout. We learn, therefore, that in these cases we may regard inflammation as our most dreaded foe; but it is equally certain, that we must view it also in the light of our best friend, and most active agent; and that if it forms the disease, it is equally necessary to the cure: without it we can do nothing; with it, provided we judiciously regulate its degrees and its mode of action, we can do every thing. In prosecuting this indication we, however, must first consider the *time* that has elapsed from the accident; the *extent and form* of the opening made into any of these cavities; and the *degree of inflammation* that is present. It frequently happens that we are not called in until several days after these accidents; perhaps also not until very injudicious means have already been employed, and we find the part excessively tumefied, hot, painful, and tender in the extreme; accompanied, probably, with a high degree of sympathetic fever. Here we must temporize and delay the principal indication, until, by bleeding and general relaxants to the skin and bowels, as well as fomentations or cooling lotions, as the case may indicate, we have abated the inflammations, general and local. In this case we combat inflammation as our mortal foe; for were we now to act with that, and attempt to close the opening by means of it, we should either destroy the joint or extinguish life. The inflammation having been sufficiently subdued, so as to act in future under our guidance, we then proceed to close the orifice.

In a recent wound made into a synovial sac, the size and form of the opening is a very material consideration. I will suppose it to be a penetrating wound, presenting a circumscribed opening without laceration: in such we are warranted in immediately calling in the aid of adhesive inflammation, which, by throwing out coagulable lymph, will agglutinize the edges of the orifice together, and thus prevent the further escape of the farriers' *joint-oil.* The necessity of this, being attempted by artificial means is rendered imperative, because it is but seldom that nature is herself equal to it, except by a lengthened process, which, although it may eventually close the orifice, does it often at the expense of the mobility of the joint: for from the extreme difficulty of keeping our patients in a state of absolute rest, the synovial mucus continues to be forced out by the inquietude of the animal: and as long as that flows uninterruptedly, it acts as an effectual obstruction to the approximation of the sides of the opening through which it escapes. Our next inquiry is into the means to be employed for raising the proper degree of *adhesive inflammation;* which are either effected by the actual cautery, or by such other applications as act powerfully on the surfaces to which they are applied. Whenever it can be conveniently applied, the former method appears the most effective; it is also, altogether, the most humane. To a stab, puncture, or other clean-cut wound, the budding-iron adapts itself well for this purpose, according to the method and under the views so well detailed by Mr. Coleman. 'The temperature of the iron should be moderately red. If it be black, the heat will not be sufficient to produce a proper discharge of lymph to close up the wound; and if it be white it will destroy too much of the surrounding parts, and perhaps do mischief to the ligament. Although the operation in itself is very simple, yet some knowledge of the structure and economy of the parts, for the purpose of applying the cautery with the best possible effect, is necessary. The object in view is to produce a glutinous substance to close up the cavity, and before the slough is removed, for granulations below to supply the place of the lymph; but if the ligament itself be destroyed by the cautery, it must, like other dead parts, separate from the living, and come away; and then the joint will still be opened. It is, therefore, of importance not to destroy the ligament of joints with the hot iron, but confine its application to the external soft parts. In these cases, it is generally proper to cauterize the whole external surface of the wound; and if the discharge is not immediately stopped, the iron has probably not been applied sufficiently deep, or too cold to produce a proper discharge of lymph. Where a cure is possible to be effected, the actual cautery will frequently close the cavity and stop the discharge. Sometimes, however, in the course of one, two, or three days, the discharge appears again by the sides of the lymph, and then the same operation should be repeated.' In some instances, the Professor has had occasion to apply the hot iron five or six times, and, nevertheless, succeeded ultimately without the least lameness.

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* 'So long as any fluid continues to escape, a foreign body is placed between the lips of the wound, and prevents the union. In the human subject, the parts may be kept in a great degree at rest; but in horses, every motion of the limb forces out the oil, as it is secreted, which tends as much to prevent a union as injecting water, or any other foreign body, between the lips of the wounded cavity.'—*Veterinary Transactions*, No. 1.

If *there be some slight laceration* productive of such edges as a simple application of the budding-iron will not suffice to unite, make use of another of a different shape, so as to pass over all the wounded *cavernous* portions, and repeat it on the second or third day, if the synovial discharge be not completely stopped. Some practitioners, having applied the iron, immediately lay on a blister over the part, which in some cases is advisable by its tendency to lessen the synovial secretion as well as that by its revulsive properties it may tend to lessen inordinate action within the cavity; but where there has been extensive bruising of the part, although there may not have been extensive laceration, it might prove injurious: neither does it usually answer where the synovial opening is at all elongated. These wounds are also sometimes treated wholly without the application of cautery or escharotic; which is attempted by first well cleansing the wound; next shaving or clipping off the surrounding hair, and then drawing the edges of the wound closely and evenly together, further endeavouring to retain them there by the application of strips of adhesive plaister, which should extend from side to side, and be again supported by an outer adhesive envelope or cap of the same: this method, if the animal can be kept quiet, and prevented from much inflammatory action, will sometimes close up the cavity promptly, and promote a complete union of parts.

In wounds of these cavities, attended with *extensive laceration*, and such also as are accompanied by so much *contusion* as to give reason to expect sloughing and loss of substance, it is evident that we must either remove such irregular and such contused portions by surgical operation at once, as recommended by some practitioners (see note *** p. 419), or we must delay the application of either actual or potential cautery until the edges become more clear and defined, or the injured portions are thrown off, and the wound brought into a state to be acted on by any of the means applicable to a recent lesion. Having, therefore, very carefully washed such a wound, to remove all dirt, gravel, &c., completely incase the contused surface in some soft mass, so that there may be as much as possible an obstruction offered to the entrance of the external air and the escape of the synovia: this end is best answered by means of a sufficient quantity of an adhesive poultice, as of linseed meal, &c. with armenian bole; which should be suffered to remain on as long as it may be supposed it can be done without irritation, and when renewed, the utmost care is requisite to guard the wound from more than a momentary exposure. A state of absolute quietude in the part is essential, by splints if the wound be in a limb; and also by neck-cradle, tying-up, slinging, &c., as will be again noticed. Nor must the constitutional means of keeping down symptomatic fever be overlooked. Previous to the application of the poultice, I have, where the contusion has appeared to be considerable, applied a pledget of the compound tincture of aloes, and have also renewed it when I again dressed the wound, which I did not usually do until the second day; and when the marks of irritation were not great, and general irritative fever did not come on, I omitted doing it until the third day. Under judicious treatment, the injured portions on the third or fourth day will usually be prepared to leave the healthy, when it will be the veterinarian's duty to proceed to such means as he deems proper to excite healthy granulations to close the cavity and fill up the gaps. If nature is working well, his assistance must be merely directed to produce a sufficient plug to the opening, derived either from the coagulation of the synovia, or from the albumen furnished by the vessels of the part. His own judgment, and the circumstances around him, must guide him here; my province is to furnish him with directions as to processes themselves[***].

Of the *other exitants* (i. e. other than actual cauterization) to a healthy adhesive inflammation, and of such as not only fulfil the former intention, but also act on the albuminous matter of the synovia itself (which by converting it into a solid, mechanically close the outlet, while the healing process is going on around and from the under edges of the wound), it yet remains to take some more notice than the bare mention. It was formerly the custom, as already hinted at, to apply the most powerful escharotics not only to the surface of the wound, but often to introduce such into the very cavity of the joint or capsule. I would hope that the practice is now obsolete, and buried in the grave of its martyrs. We are sometimes forbidden to use other than the means I am now detailing, from a mistaken humanity in the owner of the animal, who is not aware that less pain is inflicted by the iron than by the successive application of even the mildest escharotic. There are also circumstances which make this course eligible and even imperative[†]. Under this view, I would first recommend among these various applications, a solution of nitrate of silver alternated with tincture of cantharides or oil of turpentine, as a method which is calculated to fulfil both the above intentions. The compound tincture of aloes, and the saturnine extract of Goulard, are also amongst the moist preparations in use. The mineral acids, as the sulphates of zinc, iron, copper, &c., in mixture with some mild powder, are all of them occasionally employed with advantage: but it is never to be lost sight of, that their action is to be confined to the surface, and to that only. They are, at least, never to enter further within the cavity of the wound than the mass of integuments, thecas, and tendons intended to be stimulated, avoiding the inner edges of the capsular ligaments, or such extensive inflammation will ensue as will frustrate all hopes of recovery. To aid this method, the surface must be further guarded with adhesive pastes or poultices properly secured by bandages, that the coagulation of the synovia may be rendered more perfect, and the plug so made kept within the outlet. An ingenious and bold practice, which is to act on this principle, is detailed by Mr. *Thomas* Turner in *The Veterinarian*, vol. ii: and as the name of both these ingenious practitioners entitles whatever comes from that source to our especial attention, it will be particularly noticed in my observations on the practice of opened *knee* joints. I have said, hitherto, little on the attention necessary to be paid to the constitutional symptoms; not because they will not require to be carefully watched, but because the requisite treatment may be referred to the directions on diffused or general inflammation in Class I. It also yet remains to notice another indication of cure applicable to openings in any important joint of the extremities, which is, the maintaining a perfect quiescent state of the limb. So long as a horse is at liberty, he will move an open joint, and as long as he does that, he will delay his cure: and in most cases, if fatigue forces him to lie down, the injury will be greater. Mr. Percivall justly observes, that slinging is very inconvenient, and in some cases occasions much irritation and resistance; he therefore recommends instead, a partial suspension by a very broad piece of sail-cloth under the belly, by which he may rest himself or not as he pleases, and which is all that is required in many cases; but I have known others in which actual slinging was necessary to fully meet the curative treatment. It, however, should be dispensed with whenever it can; for, in addition to the evils noticed by Mr. Percivall, it wrings tender-skinned horses; it impedes digestion, and prevents the due action of the bowels; and some horses will not stale at all in this way. A very good modification of sling suspension is also that described by Mr. Turner, in his treatment of opened knee joints about to be noticed.

[***] Mr. Dawson, V.S., late of Chiswell Street, Finsbury Square, has ably described his method of acting on this principle in vol. iii of *The Veterinarian*; observing that by it, such cases as he used to think hopeless he now commonly succeeds in curing. 'I have,' he says, 'in a variety of instances, directly after the accident, dissected out several inches of partially divided or much lacerated sinew or ligament, and still the patient has done well, in becoming sound and as workable as ever. It is my uniform practice, to remove by the scalpel every part, whether sinew, ligament, skin, or what not, that Nature would herself remove by the sloughing process; by which, I conceive, several days, or probably a week's treatment, is saved, besides the inflammation necessary to produce that separation of dead from living parts. I then foment, say for half an hour, for the purpose of cleansing the wound, as well as encouraging the discharge of as much blood as can be by that means obtained; after this I dress simply, and bind the joint up by a flannel bandage of some yards in length; this dressing I repeat daily, till synovia appears, when I discontinue fomentations, and use a saturated lotion of bichloriate of mercury in spirits of wine; or a lotion made by first dissolving the salt in muriatic acid, in the proportion of two drachms of the former to four drachms of the latter and one pound of water. This dressing may be used twice a-day until synovia has ceased flowing, after which the wound may be treated in the ordinary way. In a few instances the foregoing liquids will not be sufficiently strong of the corrosive sublimate *to coagulate the synovia* as it issues from the joint; you may then use the sublimate in the form of a fine powder, either mixed with some description of farina, or even alone, taking care that it does not find its way into the joint, and as much as possible applying it only to the soft parts, and, in a manner, avoiding every thing but the coagulated synovia which will be found about the opening through which the liquid flows. In punctured wounds of joints, the introduction of the powdered sublimate a little way into the opening is the best way of applying it.'

[†] This line of treatment is called for where the living principle in the surfaces may be supposed to be destroyed, and where the external wound daily increases; and also to such as exhibit indented and very irregular edges; and a totally undefined limit of the external wound, to which there may be supposed to be added a very considerable opening of the synovial membrane itself. In these cases it is evident the actual cautery does not so well apply; neither does it usually benefit those where an unhealthy aspect of the whole surface occurs, and where abscesses, large or small, are continually breaking out. I must, however, make one decided exception in favour of the actual cautery, which occasionally happens, from the extensive ulceration going on, which, eroding some of the small bursæ around any of the larger joints, particularly of the knee and hock, occasion new sources of irritation: in which instances, it is always prudent immediately to touch them with the budding iron. It may be asked, how are such to be distinguished from the flow which takes place from the general articular cavity? to which I would answer, that I never found any difficulty in doing it. the mucus proceeds from a distinct spot, is sudden in its appearance; it is also characterised by its clear hue and insipid smell; as well as that the articular synovia which appears at this stage of the complaint has a yellow tinge, and is usually rather muco-purulent than glairy. Other exceptions will also occur, where the use of the

THE PENETRATED KNEE JOINT PARTICULARLY.

There are some practical remarks connected with this subject which require to be noticed, independently of the same accident to other articular cavities. The *knee joint* is peculiarly liable to very extensive laceration, from the hard state of our roads, and the exertions we put our horses to, whose tired limbs, making often a feeble effort to recover the effects of a trip, bring them on one or both knees with a violence proportioned to the impetus of the speed they were mov-

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actual cautery will be found to be properly united, or alternated, with mild and simply palliative means; for in the progress of a wound in parts so different in structure and powers of life as skin, secreting membrane, tendons, thecas, ligamentous connexions, &c., it must naturally be expected that it will assume such irregularities in states and appearances as to call for every variety of treatment. One part will be often running into phlegmonous inflammation, and abscesses large or small will follow one another, and which disposition we must check by one means, as we must also stop the luxurious sprouting of integumental granulations by another; while the tendons, thecas, and assistant ligamentary expansions, will require to be roused from their torpor by stimulants, or to have their dead portions separated by the use of powerful escharotics, as the nitrate of silver *(lunar caustic)* or the caustic of potash *(lapis infernalis)*, which, as being solid, may pick out the immediate parts which require this treatment; or such parts may be delicately painted over with a feather dipped in the muriate of antimony *(butter of antimony)*. Or it happens that we may mix up with their use the occasional aid of the firing-iron, of different shapes and surfaces, the effects of which in some instances, as of hardened edges, exfoliating cartilages, &c., no other treatment will equal. In fact, the requisite attention to these cases must be as varied as the nature of the parts. Is it, then, a wonder that under ignorant management so many fail?

ing at, the weight of the rider, their own inclination of form, or the nature of the ground they come in contact with. Whenever a practitioner is called to a horse with a *broken knee* or *knees*, it is a natural supposition that he is sent for for one of two purposes,—either to ascertain the state of the case, or otherwise at once to set about a cure. If he be not told as much, he at least ought so to act; and therefore he should first take into consideration the kind of horse he has before him; the length of time and the probable expense that will be incurred in the cure; and the state the part will be in after it is healed. It is evident, however, there are circumstances which make a cure worth our trial, at any expense of time and money; as in the case of stallions and brood mares of considerable value; and also when a great favourite is injured. In all others, if the laceration be considerable, and the synovial opening large, involving the *probable* loss of mobility in the joint, it is always the veterinarian's duty, and commonly his ultimate interest, to inform the owner of such probabilities, and of the chance that the value of the animal, if saved, will not meet the expense and trouble of the treatment[*].

The *curative treatment* determined on, two indications present themselves, one medical the other non-medical, but important in a horseman's view: these are, first, *restoring the integrity and pliability of the joint;* and secondly, *rendering the remaining blemish as small as possible.* In these indications the second is very much connected with the first; it therefore is more imperative on us to set out on the first under proper views. When called in soon after the accident, we must commence the treatment by very carefully washing away any grit, dirt, or other matter which may have been forced into the wound, and would occasion future irritation. If no synovia appears on the surface, it is more prudent to avoid *probing* to satisfy ourselves, but instead immediately envelope the whole knee in a poultice: indeed, in my own opinion, it is prudent to do this under every circumstance; for even if the synovia has already shewn itself, should any extraneous matter yet remain, it may thus be forced out, and, at all events, the state of the wound will be best seen by such means. The *synovia being detected*, and the opening it flows from being such as to admit of the application of the cautery, proceed to the use of it as already directed under open joints, and repeat it until a complete stoppage of the flow is effected. If the case be attended with extensive laceration, or much contusion, adopt such treatment as is likewise detailed under such circumstances, avoiding in these cases any application of cautery until the slough be thrown off, the opening be more defined, and until all the cavernous edges come within a fair application of the iron. To cases of this complicated kind, which are calculated to harass the practitioner much, Mr. Thomas Turner appears to have paid great attention, the results of which were read at the Veterinary Medical Society, and afterwards made public through the medium of *The Veterinarian;* in which are detailed the outlines of a bold, and, as we informed, a very efficient, line of practice; and if so, too much publicity cannot be given to it, and that it meet a fair trial. Sufficient abstracts, therefore, are given in a note below[†]: but the reader is recommended to a perusal of the whole, as it stands in the second volume of that useful miscellany of veterinary practice.

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[*] On this a well known and ingenious writer in the *Farmer's Series of Useful Knowledge* observes, 'If it is low down, and opposite to the bottom row, a small opening into the joint will be easily closed; a larger one need not cause despair, because there is little motion between the lower row and the bones of the leg. If it be high up, there is more danger, because there is more motion. If it be situated opposite to the union of the two rows, the result is most to be dreaded, because between these is the principal motion of the joint, and that motion would not only disunite and irritate the external wound, but cause dreadful friction between the bones brought into actual contact with each other, through the loss of the synovia.'

[†] *Mr. T. Turner's Method of Treatment of opened Joints, and particularly the Knee; read at the Veterinary Medical Society, April* 1, 1829: *from 'The Veterinarian.'*—Mr. Turner's method of treatment is after the following manner: 'Having,' says this gentleman, 'washed the external wound of the knee with a sponge and luke-warm water, a silver probe may be gently introduced, for the purpose of removing any particles of dirt or gravel within the wound. A paste is then to be prepared, composed of wheaten flour and table-beer only, which are to be well stirred together cold, and afterwards boiled for about five minutes, until the paste becomes of the consistence commonly used by paper-hangers. It may be then coloured by a small quantity of bole armenian, and applied moderately warm to the knee; being spread with a spatula as thick as it will lie, not only on the wound, but all round the joint, and for some space up the arm, as well as about four inches below the knee on the cannon. A very thin light pledget of tow, sufficiently extended to encompass the

To render the remaining blemish as small as possible is, of course, an object of great importance; for if from the extent of the wound, or from some irregularity in the process of the healing between the various parts, there remain hardened callous edges with much enlargement, forming what is known among farriers as a *bumpy* or *capped knee*, the blemish itself will not only be considerable, but

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knee, is to be applied in front of the joint, upon the paste; then nearly half a sheet of stout brown paper in a similar manner, and a large cotton stocking, with the foot off, drawn well up over the whole. On the outside of the stocking another layer of the paste is to be applied, and a calico bandage, six yards in length and from four to five inches wide, is to be rolled round the part with very moderate but regular pressure; another six-yard roller, of the same description, is then to be applied, but with a less degree of pressure. As the horse cannot be suffered to lie down during the process of cure, great pains must be taken to procure him rest, and the most attentive nursing is indispensable. He must be suspended from the ceiling or joists over the stall by a broad piece of sail-cloth under the belly. A cart-horse breaching may be also made very useful; and, with the aid of a well-contrived and cushioned head-collar, with reins, the animal's head will assist materially in supporting his weight. This is a very simple mode of slinging, as it allows the horse either to stand or recline himself as he feels disposed, and is not apt to occasion such severe wringing of the skin as when the patient is completely suspended.

'I have now arrived at the point on which my dependence is placed for the cure, viz. *never removing the dressing just described until the joint has closed, and the synovia ceased to flow.* But you will fear the irritation, pain, and symptomatic fever, which must ensue from the pressure of the bandage on the swollen and inflamed part. I will presently detail my resources to meet this evil; but must, first, beg leave to offer a few remarks on the *modus operandi* of this treatment. Closing the aperture in the capsular ligament in the shortest possible time, I apprehend to be the first indication of cure. The call for this is imperative; the abatement of inflammation, although of very great importance, I conceive to be a secondary consideration. By the second or third day the bandage becomes hard, dry, and as harsh as a board, owing to the heat of the inflamed limb having completely dried the paste. There is then usually a considerable tumefaction both above and below the bandage. The animal evinces much pain; his respiration is hurried, his pulse quick, and perhaps the appetite impaired. But the time is now arrived at which ease may be afforded the patient without in the least obstructing the process of cure. This resource consists in making four longitudinal incisions through every layer of the bandage, a notch above and below on each side, and leaving the bandage entire both before and behind. The relaxation from pressure, by the length of these notches or incisions, must be as limited as the urgency of the symptoms will allow; but in every case I make it a rule to afford this relief in some degree. From this period the constitutional disturbance comparatively ceases, the appetite returns, and respiration is tranquillized, although the pulse may remain quick. But now we are possessed of a substitute for the injured capsular ligament—a compress, closely adhering and encompassing the joint, of the exact shape of the joint, which never varies its position, is as hard as a tanned hide, and yet flexible. If by the sixth or seventh day, owing to the large size of the aperture in the capsule, the compression has not had the effect of closing the joint, and there should be found a considerable lodgement of fluid (a mixture of pus and synovia) in a depending part of the compress, another incision must be made in the compress to give exit to this fluid, beginning in the front at the inferior part, and continuing it upwards, but no higher than necessary. It is in this stage of a bad case that great nicety of treatment is required: and we are not to be at all disheartened if the joint be not closed; for there will be found a coagulum filling up the mouth of the wound, and extending to the orifice of the capsular ligament, though scarcely sufficient to close it. The nicety I allude to consists in taking care not to remove or disturb this clot or plug; for it is this coagulum, when sufficiently organized, that becomes, as it were, the cork to the bottle. This is the material point on which the success of the case depends, and which differs from the ordinary mode of treatment, it being customary to remove the bandage every day or every second day, in order to give the inflamed parts the benefit of warm fomentations, and cleansing the wound, as it is called, which in reality is the greatest act of violence that an open joint can receive in the shape of curative treatment; and just as often as it is repeated, are the efforts of nature opposed by the removal of this jelly-like substance. The next thing to be done is, to spread another dressing of the adhesive paste over the outside of the compress, and to apply another six-yard calico roller with gentle pressure upon it. In this stage of the case, regular pressure will be found rather to diminish than increase irritation; but there is some skill required even in the simple act of applying a roller to an inflamed part. This last bandage should remain undisturbed as long as possible, with the expectation that, by the next time the fluid is evacuated from the compress, the capsular ligament may be found closed, and the discharge of synovia ceased, but whether so or not, the same treatment should be continued.' Mr. Turner may be deemed a bold practitioner, by the following, which I quote without comment:—'There is one curious circumstance that not unfrequently attends the process of cure by this treatment, and which I hail as a good omen, but which many writers have remarked upon as indicative of the total destruction of the joint. I allude to an irruption and discharge from another part of the joint, perhaps the back of the knee, and which they describe as the bursting of an abscess within the joint. I merely mention this fact, to shew that these irruptions do not always communicate with the joint, and that I do not make a practice of indulging my curiosity by introducing a probe to ascertain that point, although a fluid may be escaping looking more like synovia than pus.' The following is consolatory to the possessor of broken-kneed horses, though it is in direct opposition to the language held by less sanguine practitioners, who recommend such horses to be destroyed: but we have already shewn that there are cases where a cure should be attempted under every circumstance. 'I deem it requisite to observe, that some cases of opened knee-joints are so appalling, not only from the magnitude of the external wound, but likewise from the aperture in the capsular ligament being equally extensive, that if I were called in, even at the moment of the accident, I might despair of success by this or any other mode of treatment. But the case in which I least hesitate to condemn the unfortunate subject, is the opened joint, accompanied with a complete division of both the extensor tendons, the animal being thereby deprived of the power of extending his foot, and such a complicated case is not an uncommon occurrence.'

there will be some reason to fear that the elasticity of the surrounding integuments will be so interfered with as to prevent full flexion of the limb, and thus tend to again bring the horse down; and if in the early state of such a wound there has been any injudicious application of violent escharotics to stop the synovial discharge, this will be still more likely to happen. Such a termination is, however, greatly in the power of the veterinarian to prevent during his treatment, by stimulating the tardy parts, and checking the luxuriant, so as to produce a uniformity in accretion and growth. A *moderate blister* of cantharides only over the whole, when the wound seems to corrugate in the healing, considerably promotes absorption of the prominent edges; and if a very mild one be repeated two or three times during the cure, it will tend greatly to stimulate the growth of hair and further subsidence of the irregularities. When also the whole is healed over, a knee-cap applied and held down by bandage will still further promote absorption and a proper position of the hair. Mr. Cherry, a gentleman well known in the veterinary world, has offered his brethren an ingenious method of lessening the blemishes (which will sometimes remain spite of our best endeavours), founded on true surgical principles, which ought not to pass unnoticed*. The method may be seen at length, with engravings in exemplification of it, in Nos. 15, 35, and 36 of *The Hippiatrist.*

BROKEN KNEES WITHOUT PENETRATION OF THE ARTICULAR CAVITY.

Occasionally we find that what has been called broken knee or knees turns out to be a simple contusion, in which case tumefaction, heat, and tenderness, ensue, and which inattention, undue exercise, or heating applications, may force into permanent thickening of the part, with blemish and injury to its motion; whereas a little rest, with fomentations, until the heat and tenderness are gone off, with astringent lotions and bandaging afterwards, will complete the cure. When *laceration* has taken place without injury to the cavity of the joint, having washed and dried the parts, bring the edges of the integuments as closely together as possible by strips of adhesive plaister, as already directed; or it may be attempted by fine sutures, carefully guarding the knee from flexion by splints behind it; and if the wound be extensive, it would be well to partially suspend the horse, as already noticed, to prevent all motion in the limb. A cure by the first intention or adhesive process can only be hoped for in this way. If heat and tumefaction come on, envelope the whole in a poultice; if not, apply bandages around the plaisters, and keep the whole cool by a saturnine lotion: in which way a cure may often be established, without much injury to motion or blemish in appearance.

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* 'The numerous cases,' says Mr. Cherry, 'that occur, induced me some years ago to direct my attention to the devising of some means whereby the appearance of a broken knee might be got rid of, where the injury done extended to appearance only. Cutting round the edge, and dissecting out the blemished portion of skin, has been tried, and has failed; because there would still be a large cicatrix left on the wound filling up: and when the edges of the skin have been brought together by sutures, no better success has followed; because the skin, *being on the stretch*, the sutures have given way, either from the swelling which always takes place, or from ordinary flexion of the knee in walking, or still more especially in lying down. Indeed, these means have rather increased the evil than diminished it. It is well known, that a long narrow wound cicatrises much quicker and more perfectly than a circular wound; it therefore occurred to me, that this kind of wound might be produced by dissecting out a portion of skin that should be included between two curvilinear incisions, both commencing at a point some distance above the blemish, and extending to a point some distance below it; this would leave a wound in the shape of an elongated ellipsis, the edges of which being brought together, would form nearly a straight line. By making two other incisions equidistant, one on each side, and corresponding in length with the two first made incisions, the effect of tension of the skin, on the sutures used to bring together the two edges formed in the first instance, would be taken off. I accordingly proceeded to try the experiment, and took from the knee of an ass an elliptical portion of skin, about four inches in length and about one inch in breadth, across the broadest part of it, leaving a gaping wound of corresponding dimensions. Having made the lateral incisions, the edges of the gaping wound were brought together, and held nearly in contact by sutures. There then were two wounds to fill up, but each was of only half the extent of the former: and there were four healthy edges, from whence granulation would go on, instead of two. As to the linear wound in the centre, it might be expected to partly unite by the first intention, which it did, and partly to fill up by granulating. The wounds granulated in the most favourable manner; the sutures were taken out in due time, and very soon the knee had the appearance of three straight lines, similar to those produced by the fire-iron. These scars continued gradually to diminish, and in the course of a twelvemonth, when I shewed the subject of experiment to my friends, Goodwin and John Percivall, we could only discover the lines by carefully separating the hair and seeking for them.'

WOUNDS OF THE ARTERIES.

AN intimate knowledge of the course of the large arteries is essentially necessary to every veterinary practitioner, by which he may avoid their division in operations; or, when such an accident has occurred, such knowledge will assist him in tracing the course of, and enable him to stop the divided trunk. By the elasticity of the external tunic, the divided ends of moderate arteries, and of such as would occasion fatal hæmorrhages in the human, are in the horse attended with no danger; the ends retracting within the cellular substance, and closing their orifices. It is to this that tearing out the testicles, as practised by castrators, is not attended with fatal hæmorrhage; the arteries withdrawing after the violence within the cellular tunics, where coagulum seals up their mouths. We make use of this knowledge in our surgery, by treating many hæmorrhages, which have occurred from a partial division of a vessel, by dividing the remainder, which stops the flow. Hæmorrhages are, therefore, stopped by a complete division of a moderate vessel; by styptics; by compression; by firing; or by ligature. *Styptics*, in their usual acceptation, are seldom applicable in the horse; they act by mixing with the blood, and either form it into a fine paste, by means of puff ball, flour, cobweb, &c., or they coagulate the blood within the vessels, as with alum, vitriol, &c. *Compression* is proper when the vessels cannot be easily got at, and may be made with a piece of sponge or a pledget of any other kind pressed immediately on the vessel. The tourniquet is an instrument much in use in human surgery, for effecting compression; but it is not readily applied to the horse, from the superior resistance of his parts. In docking, nicking, and sometimes in wounds of the legs, it may, however, be occasionally applied with advantage, particularly in the form of twisted ligature. *Firing* is proper when an artery or vein remains undivided; in which case the hæmorrhage may be often readily stopped by the application of the budding iron to the bleeding orifice, which either destroys the tubular cavity of the vessel, or plugs up the orifice by coagulation of the blood. It is also the means in general use in veterinary practice for checking the flow on divided *surfaces:* thus, in docking, nicking, castrating, &c., it is generally resorted to, and is found, by experience, to be the safest styptic. In deep-seated wounds this cannot be put into practice; but must be done either by means of a tenaculum or hook-like instrument, which being applied to the bleeding end of a vessel, draws it out sufficiently to pass a double thread around it: or when it cannot be got at in this way, some of the surrounding substance should be included within its curve, and a ligature passed around it. A ligature is also applied in a similar manner, by means of appropriate needles. In taking up very large arteries, it is prudent to secure both ends, or the anastomosing branches may furnish the end remote from the heart with blood sufficient to destroy life. The ligatures with which blood-vessels are now tied, are not thick, as formerly, but are found to act best when rather thin than thick.

WOUNDS OF THE VEINS.

WHEN a large vein is divided, it should be secured by a ligature above and below, or the anastomosing branches may continue the bleeding: when smaller veins are divided, the hæmorrhage soon ceases spontaneously. A divided vein will unite, and become again pervious; but an artery will not.

INFLAMMATION OF VEINS CONSEQUENT TO BLOODLETTING.

Phlebitis, or *inflammation of the veins*, is usually a traumatic affection, and is often of very serious nature: in the human it is very commonly fatal; in whom it is observed that the course of the disease progresses towards the heart, whereas in the horse it directs itself to the head; but which distinction is not probably founded on any structural or constitutional speciality*. Previously, however, to entering on the subject, I must premise that occasionally phlebotomy is followed by simple inflammation of the divided integuments and cellular substance; and which is apparently brought on by the mere effusion of blood during the act; or by some escape of it afterwards; or, perhaps, from spontaneous inflammation and serous effusion in the divided integuments and membranes themselves. The thrombus or ecchymosis thus produced is frequently occasioned by drawing the skin away from the vein in pinning up the orifice. I have also observed it to occur when the lancet has been employed by operators not long used to that instrument, which has occasioned the integumental and venous opening to be not exactly opposed to each other. Whenever, therefore, an early extravasation of blood follows bleeding, first carefully press out the effused blood with the fingers, having previously removed the pin; which, if there appear no likelihood of more hæmorrhage, do not again put in, but tie the horse's head up that day and the following night, watching him often during the day. Should the ecchymosis not be observed immediately, or when it happens that tumefaction from inflammation has already taken place within the integuments and cellular membrane, known by the circumscribed nature of the tumour, and the absence of a corded state of the vein itself, first treat by rest and frequent bathing with a cold solution of muriate of ammonia and vinegar to the part, or a solution of acetate of lead; or apply a mild blister. If the tumour suppurate, as soon as fluctuation is felt, make a depending opening, or introduce a seton through it. We will now consider something further than the mere integumental inflammation, and come at once to the point we set out at—*the inflammation of the substance of the vein itself*, which is either communicated from the integuments, or originates there immediately from the puncture, which is supposed to occasion a peculiar inflammation of the inner or membranous coat of a wounded vein†.

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* Mr. Percivall, in treating on this subject, has been at much pains to account for this peculiar disposition in the inflammation to extend so generally towards the head when the jugular is punctured, and towards the heart when it takes place in any other vein; being in the one instance against the course of the circulation, and in the other with it, as is invariably seen in the human. To reconcile these seeming discrepancies, Mr. P. observes, that although the *obstructed state* of the vessel is not the exciting cause of the inflammation, it invariably directs the course of it. It therefore remained to inquire, in what manner the obstruction was prevented in the *previous* course of other veins similarly affected, as the saphena and plate vein of the horse, and the basilic and cephalic of the human. Now these veins, Mr. P. ingeniously argues, freely anastomosing with contiguous trunks, preserve a continual flow of blood up to the obliterated part; but above this, such anastomosis does not exist, the communicating branches being few and small; consequently the blood remains to coagulate and to continue the disease. The jugular is similarly situated upwards, for it has no anastomosis to carry off the obstructed blood above the puncture, in which direction, therefore, the inflammation proceeds, the obstruction being prevented downwards towards the heart; for, having once emptied itself, the inflammation and tumefaction will prevent its receiving more blood, by which means no offending coagulum remains. Thus Mr. P. argues, that the deviation from what is considered as a fixed law in human pathology, *that this inflammation always occasions obliteration in the vein towards the heart*, is thus reconciled, and that 'the same cause is operating under different circumstances.'—*Lectures*, vol. i, p. 103. The immediate cause of the course of the inflammation may, therefore, be referred to the direction in which the coagulation is formed, which in the jugular of the horse must be upward, but in man downward, owing to structural differences between these vessels.

† Dr. Duncan, jun., who has paid much attention to this matter in the human subject, is not of opinion that it is proved to be exclusively an affection of the tunics of the vein, but that it exists frequently in the cellular membrane which envelops the vessel, and which agrees with my own observations, and with that affection which I have previously traced. The disposition in a punctured vein observed on to become inflamed is a subject involved in much obscurity. It must grow out of circumstances not mechanical; for as it only takes place in one case out of many hundreds, it is not likely but that most of those causes we assign as its probable origin have taken place in very many of those which escape. It therefore exhibits many proofs of its being produced by agencies peculiar to the then state of the vein; or to some combinations not in ordinary existence; for Mr. Percivall, who is disposed to attribute a mechanical origin to this phlebitis, yet has not succeeded, but on the contrary has failed in every instance to induce such inflammation, when purposely attempted with rusty phleams, irregular punctures, and even escharotics. Mr. Cherry also was not more successful by passing packthread through them, &c. &c. Mr. Coleman, in a communication to Messrs. Cooper and Travers, which appears in their Surgical Essays, seems to attribute it principally to the circumstance, 'that the most simple wound through the integuments of horses is scarcely ever healed by the first intention, and which is the cause why the punctured orifice in horses does not at once unite by adhesive union as the human.' But if such were the case, the disease must happen much oftener than it does. Independent of which, it appears to me that few instances could be brought forward of non-union by the first intention in the horse, so inapplicable as the punctured orifice of the divided vein in bleeding, which, when carefully performed, commonly heals in this way, or why do we direct the pin to be removed the next day?

It is probable that a predisposition to a certain form of inflammatory action is inherent in veins, and that this is either called forth by some peculiarity or error in the method of bleeding, or by some state in the parts themselves, which at one time confines the affection to the integuments, and at another carries it upward within the cavity of the vein. Of the various mechanical causes assigned for this evil, a caution is given with the directions for the operation of bleeding, to which I would therefore refer.

The *symptoms* of the injury appear about the third or fourth day usually, when the lips of the cut begin to gape, and a little lymph is thrown out; the next day the edges are more everted, as well as more red and expanded; a sanious discharge issues, or perhaps hæmorrhage occurs: the tumefied vein now feels corded, hot, and tender; and if the progress of the inflammation be not stopped, the tumefaction extends along the course of the veins: if in the jugular, it proceeds towards the head; and if it occur in any of the other veins of the body, as the saphena and plate vein, it proceeds towards the heart, hardening the vessel into a cord-like substance throughout all the diseased track, which appears as well the consequence of the inflammatory action, as by its forming the contained blood of the venous trunk into a firm coagulum, from which such trunk becomes impervious, and therefore all attempts to save it afterwards fail. Suppuration of the tumour now often appears, though sometimes the immediate punctured part, although much enlarged, will present little more than a spongy mass, from which grumous ichor distils, while abscesses form in various situations around. As the morbid action extends upwards, it frequently involves the whole neck, and often the affected side of the head, in tumefaction, from which results difficulty of motion; and often some difficulty is experienced in eating and drinking likewise. There is commonly constitutional affection also: in some cases the symptomatic fever runs very high. I have witnessed the pulse at upwards of ninety; and the excess of irritability brought on has even destroyed life.

Treatment.—The course to be pursued will much depend on the state of the disease and its previous continuance. In the early stages, our efforts should be at once directed towards closing the venous orifice, which is best done by the budding iron applied to the outer edge of the wounded orifice, but of a moderate heat only, sufficient, however, to occasion a slough: with some an eschar is formed by escharotics, as oxymuriate of mercury (corrosive sublimate); but I generally prefer the iron, as occasioning less after-irritation. The cautery sometimes at once stops the ichorous oozing, and saves the obliteration of the vein, which is of considerable consequence, as, when lost, it is some time before the vertebral (the horse not having an external jugular as the human) can return the blood sufficiently to support the functions of the parts properly: it will, however, be sometimes necessary to repeat the cauterization every two or three days, to ensure success. It is of importance to keep the horse as quiet as possible, and to restrain the neck from all motion; which latter is best effected by tying up the head. It is also recommended to apply a blister upwards, in the course of the tumefied vein, and which seems to assist the action of the cautery materially, by lessening the general inflammation above: this, in fact, is an indication never to be lost sight of.

When, however, we have no hopes of saving the veins from obliteration, but, on the contrary, a disposition manifests itself to form abscesses in various situations of it upwards, we must proceed to more active measures; one of which is to take up the vein altogether: by this, in some instances, the morbid action has been checked; and either the vein has become absorbed, or has sloughed away as dead matter. This may be effected by inclosing it within a ligature both above and below, to the extent of its disease: or if preferred, it may be at once dissected out. But this plan is only to be recommended where the horse is situated at a distance, and not immediately under the practitioner's eye. Neither is it at all practicable, when the tumefaction and the morbid action extends itself to the cellular substance and to the integuments around, forming in them large abscesses and extensive sinuses. In such cases, it is more prudent to pass setons through them, or to apply escharotics, as the case may indicate. When the lips of the wounds already throw out pus, I have not found benefit from the iron; but have preferred injecting it with a moderately strong solution of sulphate of zinc. Farriers often introduce a solid piece within the opening. When the irritation is very considerable, both this and the iron had better be suspended until that has been lessened by cold applications. The practice of the farriers in coring out the sinuses with corrosive sublimate is commonly too violent; yet I have sometimes found these ulcers get into such an indolent state as to require very active means to bring on a healthy action in their sides.

Another morbid consequence of bloodletting arises frequently from injudicious bleeding in the plate or in the thigh vein; in which cases, from the force used, or from an improper part being chosen, the phleme passes through the vein into the fascia which covers the muscles, and over which these veins pass. In these cases the fascia inflames, and a formation of matter or pus takes place within it, which, as it cannot escape, insinuates itself to some depending situation: an opening should, therefore, be made to evacuate the matter, or a seton may be passed through it for this purpose, having first premised fomentations to relax the inflammatory tension: if a rowel be inserted into the same limb, it increases the evil; but if in the opposite limb, it is frequently beneficial.

GUNSHOT WOUNDS

PRESENT some considerable difference in appearance and effect from other wounds, particularly in their first stages; and though wounded horses in battle are not often much attended to, yet, when circumstances admit of it, by proper treatment, many hundreds of those might be saved that are generally abandoned; for, even if they should not prove afterwards altogether fit for troopers or chargers, they may make excellent bat or draught horses, which is a matter of great moment in an army. I have been witness to the abandoning of numbers of wounded horses, which in any other situation than a precarious one, or in an enemy's country, or where a blameable indolence prevailed, might have been cured and rendered useful. In consequence of horses not being impressed with anxiety, from the hopelessness of their situation when wounded, it is surprising how little irritability they shew until the constitution becomes affected. I stood in Holland by a horse which had his hinder leg taken off by a cannon shot, above the hock, but the blow did not throw him down; whereas, in a few seconds after, an officer, who was struck with a spent bullet in the back, that penetrated only through the integuments, was rolled over by the shock. Gunshot wounds are a species of bruise, in which, from the velocity of the ball, the parts become pressed together and lacerated, sometimes in a very peculiar manner. Any one acquainted with these wounds is aware, that nothing but an attentive examination can discover the track of the ball: there is no reasoning upon its probable course from its entry but what may prove fallacious, for sometimes the slightest substances will turn its path; while at others it penetrates every thing it meets with in its passage: neither can a simple view of such a wound enable us to judge what parts are injured. The laceration and bruises are such in these cases, that there is seldom hæmorrhage at first; but it occurs sometimes unexpectedly in a few days afterwards, as soon as sloughing commences; the vessels therefore should always be secured when they can be got at to prevent this, for we cannot keep a tourniquet conveniently on a horse. We must not judge of the extent of a wound by the simple appearance, for the injury may be such as to kill many parts that are not discoloured: this may be particularly remarked in spent ricochet balls. The blackness observable in this kind of wounds does not arise from the balls burning them, nor must the application be conducted under this supposition.

The complexity of the *treatment* of gunshot wounds arises from the degree of bruise received not bearing any comparison with the external wound; from the uncertainty of the direction of the ball; and from the introduction of foreign substances, as the ball itself, harness, clothes, &c. It was formerly deemed so essential to remove these, that every gunshot wound was dilated and tortured till the suspected substances were found; the consequence was, that many horses were lost from the irritation unnecessarily occasioned: but it is to be remembered that extraneous substances are a less serious evil than the increase of the original mischief, by too great an enlargement of the wound to hunt for them; yet when it is absolutely necessary to do it, as when the ball can be felt, or when there are substances known to be left, whose continuance would infallibly irritate, then it should be done at once. In the sloughing stage we should promote the separation of the living from the dead parts by warm stimulating applications (see *Digestives*, *Mat. Med.*). When the suppurative process is, however, too great, it should be checked by astringents, and the general strength must be supported by tonics and liberal feeding.

CLASS XII.

OF PHLEGMON AND ACUTE ABSCESS.

By *phlegmon* we understand an inflammatory tumour*, which attacks the cellular tissues or membranes, with their connections, throughout the body; but more particularly it is frequent in the cellular substance which connects the cutis with the adjoining parts. *This inflammation, it has been already noticed, has several terminations;* but it is its *suppurative* one only that I here propose to treat on, as being the parent of abscess: *I shall yet have occasion to return to the others.*

By *abscess*, in its most extensive sense, we include every collection of fluid (not encysted) which interrupts the integrity of a part to make room for itself: but in its limited sense, as I now propose to use it, it characterises a collection of pus formed by a quick or by a slow process of suppuration, and which varieties have occasioned abscess to be divided into acute and chronic: to the first of which I propose now to confine myself. When an abscess forms, the following process takes place:—The minute vessels of the part are stimulated to effuse or pour out coagulable lymph, or, as now more often called, adhesive matter, within the cellular tissue, the consequence of which is distention or swelling, which here, as elsewhere, produces uneasiness and tenderness, as the reaction occasions throbbing, heat, and, when the hair allows us to detect it, a blush on the superficies of the tumour. Arrived at this state, the tumour may take on various changes by peculiar processes within it: the suppurative one is supposed to take place near the centre of the effusion, where, by a change in the action of the inflamed vessels, pus begins to be secreted, which, as it increases, promotes absorption of the solid sides of the tumour; and it is fortunate that, by an apparent conservative law of animal life, such absorption is most active towards the surface of the body, by which evacuation of its contents can be made without prejudice to the constitution. There are many difficulties to combat in veterinary practice which almost vanish in human pathology: thus, in the formation of human abscess, the cessation of pain and of the universal rigors mark almost the moment of commencement of the suppurative process, and point out the necessary stoppage of a discutient treatment, the continuance of which would now prove injurious. Neither is fluctuation or direct prominence in the suppurating abscess so clear in our subjects, from the thickness and tenacity of the integuments, as in the human, though some little pointing, softening, and separation, as well as denudation of hair, may be observed: it therefore becomes us to make our examinations the more closely, that we may inform ourselves, by more occult signs, of the actual state of the part.

The *treatment* of *phlegmon and abscess.*—In the early stages of such tumours, a discutient plan of treatment, as detailed under Local Inflammation, should be pursued, but, as already hinted at, it should cease immediately as suppuration commences. When I was in France, I saw at Alfort two cases then under treatment for large phlegmonous tumours, where active stimulants had been first tried; and not being attended with advantage, two or three deep scarifications were carried down to the bottom of the tumour, and the wounds treated with warm stimulating dressings; which treatment was then considered as one which offered very beneficial results; but as I meet with little subsequent notice of it throughout the continental writings, I presume it was not continued. In human surgery it is not unknown, nor yet abandoned by some practitioners. Being assured that maturation is completed, whatever doubts may exist in the human subject between the propriety of a natural or an artificial opening, the thickness of the integuments, and the fear of the extension of the suppurative process inwards, or in the course of the gravitation of the fluid in our large domestic animals, makes it always prudent to form an artificial opening in the more dependent as well as prominent part of the tumour. This may be done either by direct section, insertion of seton, or the cautery. Incision is effected by the abscess, lancet, bistoury, or scalpel[*].: but in every case the opening should be sufficient to give a ready exit to the matter which has formed, and that which may continue to form. In some situations, as where the natural outlet would have formed had it been suffered to proceed, and that which would be the most dependent do not accord, it may be prudent to make an incision in the former, and insert a seton into the latter: a seton may also take place of incision altogether, where the blemish of the latter would be an object, or its extent feared[†]: but where a full incision is made, the cure is usually quicker, and less likely to be followed by sinuous cavities. It is, however, necessary to be careful in making it when it dips downwards, that it is made in the course of the muscular fibres, and not in the direction of considerable branches of nerves or bloodvessels. Caustics, or in preference the actual cautery, are now and then admissible, as means of forming the outlet; instances of which occur when the maturation has been tedious, and the parts around may be suspected of being unhealthy. A healthy abscess requires little subsequent attention; and it is presumed that it is not necessary to forbid the revival of the old custom of stuffing up these openings with tow, &c., and still less with hard plugs or tents, which are apt not only to pen up the pus, and give it a disposition to burrow, but, by introducing a hard body between the lips of the opening, produces hard unhealthy edges and a fistulous outlet. If from the state of the part any stimulant be required, let it be such as mild solutions of zinc or iron, or the compound tincture of aloes or myrrh, or it may be sprinkled with resin, or the unguent. resin flav. may be applied, if a prejudice exists in favour of unguents. A dependent part, where a lodgement of matter appears forming, should be daily injected with a solution of zinc, or tincture of cantharides; and moderate pressure should be made by pad and bandage over the most depending portion of it, and should be so managed as to force its contents towards the outlet; on which will greatly depend the non-formation of those states consequent to abscess, which are yet to be described.

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* Tumour is here used in its popular signification only; for the strictness of modern nosology confines tumours to distinct enlargements without inflammation: but this limit involves many inconveniencies, and some inconsistencies, in classification.

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[*] ‘L'incision convient dans un grand nombre de cas, notamment dans celui d'abcès inflammatoires. Elle se pratique en plongeant d'abord dans la tumeur la pointe d'un bistouri, dont le tranchant regarde les parties qu'on veut diviser, de manière à couper de dedans en dehors les tégumens qui les recouvrent. La grandeur de l'incision doit être proportionée au volume de la collection. On l'exécute suivant le trajet des fibres musculaires, des vaisseaux et des nerfs sous-jacens, et, autant que possible, à la partie supreieure de la tumeur, parce que là seulement elle présente le point le plus aminci des tégumens, au lieu de la prolonger jusqu'au bas, convient de pratiquer une contre-incision dans cette dernière partie, et quelquefois il est avantageux de passer un séton dans les deux ouvertures; c'est le moyen d'éviter une incision trop considérable, d'où résulterait une cicatrice étendue et souvent difforme. L'abcès etant ouvert, on peut presser légèrement la poche, et même y introduire doucement le doigt, pour reconnaître si l'incision a suffisamment détruit les obstacles à l'écoulement du pus; mais il importe de ne point rompre les *brides* qui s'étendent d'une paroi à l'autre. Ces brides sont produites par les vaisseaux et les nerfs qui entretiennent la vie des tégumens; leur section pourrait causer la flétrissure de la peau qui couvre l'abcès, et l'empêcher de se réunir à la base du foyer. Lorsqu'il s'agit d'un abcès profond, on pratique l'incision en le fond du foyer, et l'on prolonge plus au moins l'ouverture en dégageant l'instrument.’

[†] In making a seton, avoid the custom of tying the two ends of the tapes together: when this is done great danger is incurred, that, in the movements of the horse he may catch the loop in some hook or hold, and by that means tear out the seton and greatly lacerate the integuments.

STRANGLES.

THIS disease, so called from its interfering with respiration occasionally[*], one should be led to suppose must be enveloped in some extraordinary obscurity, since it has given rise to so many discordant opinions concerning its nature and essence. Hurtrel d'Arboval notices more than twenty authors whose notions regarding it are as opposite as the poles. Many of these, as might be supposed, have hinged on the locality of the affection, as others have been formed on its appearing about the adult period[†]. It has been very generally considered as a *constitutional* affection; because, like measles, small-pox, &c., it was found that few escaped it altogether, and that, having had it once, the aptitude was supposed to be then destroyed[‡]. It has also been almost as generally believed that this *animal poison*, or innate disease, had arrived at its maximum, was thrown off by maturation, and that it was attended by a favourable change in the constitution[§]. John Laurence tells us it was formerly called the *strangullion*, which would appear a corruption of the French word *étrangullion*, derived, as we may suppose, from *étrangler*, to strangle. It is evidently of febrile origin. The late Mr. Castley, whose death every veterinarian mourns, thus notices this singular equine affection: 'Often when a young horse is looking sickly, delicate, or thriftless, farmers or breeders will say, "he is breeding the strangles," or that "strangles hangs about him, and that he will not get better until he gets over that complaint." There is much truth and quick-sightedness in this observation of its approach, and some breeders are particularly expert at catching the first premonitory symptoms. I myself knew a shrewd farmer and breeder of horses in Lincolnshire who was thus gifted. I was admiring some young horses of great beauty and promise, and was congratulating him on his chance of making a considerable sum of money of them. His reply was, he also hoped so, but he must wait until the strangles which he said 'was breeding in them would shew themselves.' Such were his own words, and as I had an opportunity of making a future inquiry, his prognostic I found from his friend's account was verified, and that this friend had been directed to call on me, and thank me for a warning hint to separate three high-bred ones, but very delicate, from the rest; and to protect them from cold, and feed them nutritiously: for I had long before made up my mind that the strangles, though a febrile complaint, bore, in the high-bred colt, more of the character of synochus than of synocha. These theories, every one of them, admit of such apparent corroboration from occasional anomalies, that it is hard to arrive at the truth: but, in my own opinion, we view it most correctly, when we consider it as a peculiar constitutional disposition to throw off morbid accumulations, and which appear to render young horses circumstanced as we have stated liable to a phlegmonic attack of the cellular substance between the angles of the jaws which envelops the submaxillary glands, and often extends itself to the parotid also, and is usually productive of abscess. The affection has been divided into mild or malignant, and true and false, or bastard strangles: but these definitions are not clear; for though there are cases in which the symptoms are milder than in others, it is not proved that any *specific virus* is ever left, from which future depositions are formed, called *vives**. Neither is there reason to suppose the strangles inherently infectious, though it has been said to

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[*] Gervase Markham calls it, 'a great and hard swelling between a horse's nether chaps, *upon the rootes of his tongue*, and about his throat; which swelling, if it be not prevented, will stop the horse's wind-pipe, and *so strangle or chouke him*; from which effect, and *none other*, the name of this disease tooke its derivation.'

[†] It is certainly not altogether confined to the adult age; colts have had it at three months old; and at every period between that and puberty; its attack is also protracted, in some horses, until they are aged, when the process of maturation is apt to be imperfectly formed, and a solidification of the lymph thrown out leaves those indurations which are called *vives*.

[‡] Hurtrel d Arboval, with many others of the French school, ridicules the idea of its being a congenital and constitutional affection: observing, 'Attribuer la gourme, puisqu'on persiste à l'appeler ainsi, à une espèce de levain qui se mêle avec le sang, au moment de la conception de l'animal, à un virus existant dans la masse, au changement de nourriture, à une fermentation chimique comparée à celle que toutes les liqueurs éprouvent pour se clarifier, à une dépuration du sang et des humeurs, à des humeurs crues, à une lymphe visqueuse, etc. n'est-ce pas parler vaguement, s'égarer dans un labyrinthe, reculer les progrès de l'art, et jusqu'à un certain point montrer d'ignorance?'

[§] Mr. Castley, a very ingenious writer in *The Veterinarian*, favours this opinion of the perfecting of strangles, as producing a favourable constitutional change: he observes, that the common notion, when a young horse is sickly or thriftless, is, that he is 'breeding the strangles,' and that he will not be better until he get over that complaint: and he inclines to think that there is much truth in the remark, for he himself noticed young horses in unfavourable condition for months: but, the period of strangles once passed, he has been struck with the remarkable change that has taken place in them for the better. This is a very common opinion among breeders, and we have many other proofs where an occasional disturbance in the system, or where an acute attack, has carried off a chronic one; and although I am not prepared to deny that such may be the case, this latter fact will account for the benefit without the former. It was common with the French also to maintain a similar opinion. *Gourme*, the French name for strangles, stands thus in the celebrated Dictionary of Terms in *Hum. & Vet. Med.* 'Gourme *struma*; écoulement d'une mucosite plus ou moins épaisse par les naseaux des jeunes poulains. On la distingue en *bénigne, maligne* et *fausse*. On dit que le poulain jette sa gourme par les narines, par les jarrets, par d'autres parties du corps.' By which it is evident that the strangles is yet regarded by some as a strumous or scrofulous affection, inherent in the constitution, which it is necessary to throw off by some outlet. Professor Dick is also said to observe, in his instructive course of lectures, that strangles is probably a much more complicated disease than is generally supposed; and that abscess under the jaws is not its constant termination, for it on some occasions gives rise to collections of matter in other parts, &c. Mons. Rodet's opinion, on the contrary, is at variance with the complicated nature of strangles, and with its specific constitutional quality; and he attempts to refute both by observing, 'the horses of warm countries, such as Arabia, the coasts of Africa, Spain, and even Italy, never have the strangles, a disease only known in the middle and northern parts of Europe. Now, have we not a right to ask, by what privilege the horses of the south are preserved from strangles, if this affection were solely to be attributed to the existence of a particular poison? And also, why the Barbary horses (we cite them as an example) are less sickly and more vigorous than those of our own country, as they do not go through that purification, that cleansing, which is here considered so indispensable to the health of our horses?' Hurtrel d'Arboval also observes, 'On a avancé que la gourme était non seulement inevitable sur le plus grand nombre des chevaux, mais encore nécessaire et salutaire, et que les chevaux qui l'avaient eut en acquéraient plus de valeur, en ce qu'ils devenaient en général moins sujects aux maladies. De telles assertions ne sont soutenables qu'autant que l'exactitude en est demontrée jusqu'à l'évidence; or, rien n'est moins prouvé que ce qu'elles renferment, puisqu'il est des pays où la gourme n'est pas connue, et que, dans ceux même où elle passe pour commune, il est possible d'en prévenir le developpement par une bonne éducation, un régime bien ordonné, des soins bien entendus, etc. On lit dans Aristote que les chevaux qui vivent en troupes dans les bois sont exempts de la gourme. Xénophon n'en fait aucune mention, bien qu'il ait parlé de beaucoup d'autres maladies beaucoup moins intéressantes que ne paroissait l'être la gourme de son temps et même depuis. Tous les auteurs Italiens et Espagnols qui ont écrit sur l'hippopathologie n'ont rien dit de la gourme, pas même Ruiny, qui a si bien écrit de toutes les maladies, et qui n'eût pas omis celle qui nous occupe, si elle avait été connue au temps où il vivait. D'autres auteurs assurent qu'elle n'existe pas dans les régions du Nord, telles que la Norvège et la Russie, ni en Arabie, ni en Afrique, pas plus que dans les pays chauds. Parmi les mo-

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dernes, tous ne parlent pas de la gourme, ou n'en disent que cequi a été déjà dit. Volpi n'en dit pas un mot dans son. *Abrégé de Médecine Veterinaire Pratique*, publié en 1813, et traduit de l'Italien en 1819. Il paraît que les chevaux de ces pays, ceux du moins qui ne mangent presque jamais que des herbes et pas de grains, ce qui suppose, sous tous les rapports, un grand rapprochement de l'état de nature, ne sont guère sujets à la gourme. Ce qu'il y a de certain, c'est que, dans nos département meridionaux, la gourme est beaucoup moins commune et moins fâcheuse qu'ailleurs. Sans même chercher aussi loin, tous les chevaux du nord de la France n'ont pas la gourme; ceux qui ne changent pas de nourriture, qui sont toute l'année au même régime, qui ont une bonne hygiène, n'ont point de gourme, et n'en jouissent pas moins d'une santé constamment bonne. Au contraire, les poulains que l'on change de lieu d'habitation, de température, de nourriture et d'habitudes, qu'on transporte d'un lieu dans un autre, qu'on tient tantôt a l'écurie et tantôt aux herbages, qu'on engraisse et qu'on laisse maigrir alternativement, ont tous les ans, quelquefois plusieurs fois, des catarrhes qu'on appelle gourme. Il n'y a pas un cultivateur, un ménager, dans les pays d'élèves, qui ne sache ce que nous disons, et qui n'en soit convancu d'après sa propre observation. C'est une épreuve que nous avons faite nous-même sur plusieurs chevaux de prix. élevés par nos soins, et nous pourrions citer beaucoup d'autres faits à l'appui. Nous montons encore en ce moment une jument de race Normande, Venice, au monde dans notre ecurie; elle est très vigoureuse et n'est jamais malade, elle s'est tirée très heureusement et sans reliquat aucun de la gastro-enterite, dite épizootique, de 1825; elle approche de douze ans aujourd'hui, et cependant elle n'a jamais jeté sa gourme. Sa mère, qui nous a servi pendant dixsept ans, a effort le même exemple; elle rendait encore de bons services à l'âge de vingt trois ans, dans une ferme où elle avait les invalides, lorsqu'elle reçut dans les pâturages un coup de pied qui lui cassa la jambe, ce qui obligea de la sacrifier. Il est donc pas vrai que la gourme, ou l'affection à laquelle on a donné ce nom, soit une maladie inevitable; il n'est pas plus vrai qu'elle soit nécessairé et salutaire, puisque, en admettant même, contre l'experience, qu'elle n'arrive qu'une seule-fois en la vie de chaque individu, les partisans de sa réalité lui reconnaissent des suites capables d'altérer plus ou moins, et pour un temps indéterminé, la santé des animaux qui l'ont eu.'

* Few terms in farriery are more indefinite than that of *vives*. I have scarcely ever met with any swelling of the head, which has not been attributed to *vives*, or, as I understood the matter, to the strangles not 'cleared off.' If the inflammatory attack of strangles had left any enlargement in the parotid or submaxillary glands, then it was as impossible to deny the existence of vives as to convince farriers they were not the occasion of bad eyes, lampas, and even glanders; and as though well 'drained strangles' were to render these glands invulnerable to any accidental tumefaction afterwards, when such did take place, the 'undrained strangles' had degenerated into *vives*. When older horses have strangles, it often happens that the tumid glands do not suppurate so readily as those of younger horses, and here some enlargement is often left. These are sure to be called cases of '*rank vives*,' which is or are (for I know not whether vives be singular or plural) the very *spectre* in the imagination of the farriers of the old school.

have been given by inoculation*. A number of horses having it together is not a proof of its contagious properties; any more than some escaping and others having it is a proof it is not so†. The strangles, in many instances, produces so little interruption to the health, particularly in mild weather, and at grass, as to inflame, maturate, and heal, without the matter being hardly noticed. In some cases, however, it reduces young horses to a state of considerable emaciation; and is said, when very long protracted, to degenerate into glanders: and, by a reference to that subject in Class III, it will be seen that the transition from the one to the other does occasionally take place. The exciting *causes* appear to be those which are productive of catarrh; thus it is most prevalent in the spring and in damp cold weather than at other times. Hurtrel d'Arboval connects it with dentition; but the circumstances that it is not confined to that period, nor is indigenous to every climate, weaken such supposition.

Symptoms.—The disease usually commences with the common symptoms of mild catarrh, or, as popularly expressed, of slight cold and fever. The horse is somewhat dull, has often cough, some soreness of throat, a slight disinclination to food, but still more to water. The under surface of the throat between the jaws swells, and is hot and tender: sometimes the tumefaction extends to the ear of one or of both sides. On the second or third day it is not unfrequent for the nostrils to throw out a muco-purulent discharge; and if the affection be considerable, his mouth is suffused with a mucous discharge also, or his saliva is slabbered out in great quantities‡. Now and then the lungs become slightly inflamed, and heaving at the flanks, with oppressed pulse, are present. In most instances the pulse is somewhat hurried.

Treatment.—When the inflammatory symptoms are considerable, treat exactly as directed under catarrh, with this single exception, that the bleeding is not to be pushed, nor even to be attempted at all, unless there be some urgency in the case; that is, unless the pulse be hard and much quickened, with hurried respiration; or that the extremities be cold, the cough very painful, and the nostrils red; then bleed without hesitation. Clothe the head with a hood, and, if it can be done without distress to the animal, apply, by means of a nose-bag, a warm mash, which should be frequently renewed: if it cannot, give a warm malt mash frequently. I formerly advocated the use of poultices much in these cases; but they are very difficult to apply, and the air is apt to get between them and the skin, and produce cold; I therefore, of late years, have preferred to direct the use of a stimulating ointment rubbed over the whole tumefied part, composed of half venice turpentine, and the other half of blistering ointment, which I have found to answer the grand end of stimulating to the formation of pus. There is also another eminent advantage gained by blistering here, which is, that the local consequence is hastened, while the constitutional disturbance is retarded or altogether subdued. The tumour having suppurated, sometimes bursts inwardly, in which case the future cure must be left principally to nature, and nothing more, in general, will be requisite than mild food, as green meat, if procurable, and gentle exercise. But when the tumour points outwardly, as soon as the matter is felt to fluctuate freely, but not before, it should be opened with a lancet, which will tend to shorten the complaint considerably. It is customary to squeeze the abscess violently with the fingers to press out the matter, which is wrong: a very slight pressure for this purpose is proper, but only a slight one; and if a natural opening have occurred, and it should be small, either introduce a pledget smeared with digestive ointment to keep it from closing up, or, what will be better, enlarge it. If the disease runs its course in the usual manner, finish with a gentle dose or two of physic; but if it be protracted in its maturation, or that abscesses do not heal kindly, or the nasal gleet continues, immediately enter on a course of tonics, with liberal feeding and a pure but mild air. It is in this state that it is sometimes mistaken for glanders; and as, when greatly protracted, it does certainly sometimes become glanderous, it behoves the practitioner to compare all the appearances present with the distinguishing features of this disease as already fully detailed in Class III.

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* M. Toggia, jun., has inoculated colts both with the matter of the abscess, and the purulent secretion of the nose, by which he produced true strangles (proved by future non-susceptibility) of a mild type. By this he also proves, as he thinks, both the *contagious* and *specific* nature of the complaint.—*Recueil de Vet. Med.* Feb 1828

† 'Ce qui a sans doute porté regarder l'affection dite gourme comme contagieuse, c'est qu'on l'a vue se manifester en même temps sur toutes les bêtes chevalines d'une exploitation rurale, quelquefois d'une commune ou d'un canton; mais cela vient d'une égale participation à des causes communes, ou tient au résultat de l'action permanente de certaines localités, ou aux altérations passagères de l'air, des boissons, des alimens de toutes les choses nécessaires à la vie des animaux.'

‡ This nasal discharge appearing before the suppuration of the salivary glands, is called by farriers the *bastard strangles;* but which symptom has little to do with the specific inflammation of the strangles, but is rather a common symptom of the catarrhal affection which accompanies the disease, and which I am disposed to think is, in many instances, merely the exciting cause of the specific action. That is, that such colts in many instances take cold, and catarrh follows; the predisposition to strangles existing is now brought into action, and accompanies the catarrh, which is itself purely accidental. This view of the matter will serve to explain the diversity of symptoms, and the great difference in intensity in the disease.

WARBLES.

These are small tumours, consequent on saddle or harness pressure. In the adhesive state of their inflammation, attempt to reduce them by saturnine washes, with vinegar, &c. &c. If suppuration appears inevitable, promote it by stimulants; and as soon as it appears ripe, open with a lancet, or carry a very small seton through the tumour, which I have found to be an effectual preventive of the induration called sitfast. Sitfast is either formed after maturation, by repeated friction delaying the granulating process, or it is formed before by an indolent state of the tumour, by which the adhesive matter thrown out indurates. When a sitfast is formed, do not tear it out with pincers, after the manner of some farriers, but first blister it; and if it still remains prominent, dissect it out without removing any integument.

POLL EVIL, FISTULOUS WITHERS, WARBLES, are but so many abscesses, in their recent stages: yet, as it is more common for us to see them under a state of aggravated ulceration, and as they not unfrequently assume a tardy process and unhealthy inflammation from the beginning, the consideration of the former is referred to the next class, while the latter are grouped with Diseases of the Feet, Class XX.

CLASS XIII.

OF CHRONIC ABSCESS AND ULCERATION.

THE process of healthy inflammation is verified in acute abscess; in chronic abscess it wants life, either from the nature of the constitution generally, or the nature of the part individually. As there are peculiarities in the nature of inflammations themselves, this may have some influence; but it must be subordinately, for it is to phlegmonous inflammation that my attention is particularly directed in the present instance. In these cases the effusion of adhesive matter is slow itself, or, if quick, it makes little difference to the case; it is the tardiness of the suppurative process commencing. In some cases the adhesive effusion remains in a state of induration, and suppuration never commences: at others, the suppurative phenomena are imperfectly developed, and, when at length, it is somewhat established, and an outlet, natural or artificial, is made, which is often not done until other parts have been affected likewise, it then happens, that, instead of a healthy granulating process, unhealthy ulceration follows.

Ulceration is a process directly the reverse of granulation; for as that *builds up*, so ulceration *breaks down* parts which become absorbed through the medium of the lymphatics; the surface thus acted on producing at the same time a purulent or other discharge. An abraded surface thus circumstanced is called an *ulcer*, for the cure of which we must endeavour to remedy the morbid action by exciting a new and more healthy one; by which the part being then brought to the condition of a simple wound, will heal. When ulcers have continued for a long time, it is often necessary to employ constitutional remedies to establish a cure. In full habits we increase the other secretions, as those of the bowels, the kidneys, the skin, &c., by purgatives, diuretics, and such remedies as act on the skin. We also lessen the excess of morbid secretion of pus, by establishing a new and artificial drain in the neighbourhood, which is done by setons or by rowels. In some cases, instead of existing plethora, the ulcer has occasioned or is accompanied by great irritability of system, which must be combated by opium, and other sedatives; or if debility become very apparent, tonics must be given, together with a liberal diet. In general cases, stable soiling, a course of carrots, or other total change of food, assists the healing and restorative process greatly. Ulcers are often found of a greater extent internally than externally: and when such cavities extend in different directions, they form the *sinuses* of the surgeon and the *pipes* of the farrier: when the edges of the external opening are hardened, it is said to be *fistulous*. In general cases, the longer an ulcer has lasted, the more obstinately will the vessels have gained a diseased habit, and the more difficulty there will be to bring them back to a healthy state. The external means employed for this purpose are usually three; stimulating injections, seton, or incision; which operations it will not be necessary to enter upon here, as we shall proceed to describe the more common and important ulcers, with their *treatment*, separately. It remains, however, to state, that ulcers in general are apt to be treated by farriers erroneously, by plugging up the sinuses, by which the matter formed penetrates farther, bringing into its own action all the neighbouring parts. They likewise dress them so seldom, that the pus frequently takes on a process of decomposition, and becomes acrid; and, lastly, they are apt to neglect to gain a depending orifice for these collections.

POLL EVIL.

THIS so called complaint, from its situation at the poll of the head, is the consequence of an abscess forming within the cellular membrane of the part, and extending downwards: sometimes it may form underneath the cellular attachments of the cervical ligament, or *fix-fax* of the farriers. In either case it is usual, unless it be very early checked, to extend to the ligamentous connexions of the articulations and mucous capsules which surround them. It is most common in large coarse horses, and is not unfrequently brought on in them by irritation of the skin around the bulbous roots of the hair of the mane, which occasions them to rub the head against the manger continually, and sometimes so violently as to inflame and produce abscess in the parts underneath, particularly where a mangy disposition is present. It is also, sometimes, occasioned by hanging back in the stall, and thus forcibly pinching these parts between the collar rein, or halter, and the cervical bones: blows also act in the same manner, given either by the horse himself in rising, or inflicted by brutal chastisement. Inflammation is the result, in a degree proportioned to the extent of the injury: if moderate, resolution may occur; but if it have been great, and the ligamentous parts have become injured, resolution is less likely to happen: on the contrary, from the living powers of these parts being comparatively small, an unhealthy inflammation follows, and a double action is the consequence,—a suppurative one in the integuments, and an *ulcerative* one in the tendinous and ligamentous parts which surround the attachment of the cervical ligament; from which circumstance it is that we so seldom meet with healthy pus from poll evil; but, on the contrary, a thin sanious discharge, or sometimes a more glairy one, when any of the mucous capsules are affected.

Treatment of poll evil.—This regards its *nature* and its *extent*. If it be pure *phlegmon* or the early state of abscess, whether it be *deep* or *superficial*, we must endeavour to promote *resolution*; but the means of so doing will be somewhat different as it is one or the other. If *superficial*, that is, if the inflammation be confined to the integuments of the part, apply discutients, as saturnine washes, or muriate of ammonia, with vinegar and water, which should be kept constantly wet, and in contact with the part. If it be deep, that is, if the inflammation have extended to the ligamentary connexions underneath, applications of a more astringent and tonic nature will best promote resolution in these torpid parts, as pure vinegar, or rubbings with terebinthinated tincture of cantharides. When all hopes of promoting resolution of the tumour have ceased, we should then as actively hasten the maturation: if there is reason to consider it as superficial, this will be best effected by hot fomentations or poultices, keeping the part also smeared over with some unctuous matter: but if it be supposed that the evil is deeper seated, the end will be best answered by a mild blister rubbed in every other day, until the fluctuation is felt either on one side or the other, when the next indication is to procure a speedy evacuation to the contents, and a depending orifice for its future passage, that no sinuses may form; this may be done by the introduction of a seton, first inserting the needle in the centre of the tumour at the root of the mane, passing it out at the most depending part; and in case the tumour is a central one, and its limit extend equally over the neck, do exactly the same by the other side. But when, from improper management, matter has not only formed, but has been suffered to remain, or has only evacuated itself by a superficial opening, either natural or artificial, and not from one in a depending situation, by which the accumulation extends under the cervical ligament, leaving it hollow below; in such cases, the healthy secretion of pus always ceases, and instead of it, a thin ichorous or a glairy discharge succeeds; the ulceration also extends still further; sinuses form in every direction; some of the bursal cavities open, and not unfrequently the cervical vertebræ become carious*. Under any of these appearances, a very strict examination must be made, which is best done when the horse is cast, having his head elevated by a bundle of straw, and turned towards the light. Enlarge the lateral opening so as to admit of a free examination, by means of both probe and finger, of the whole extent of the evil, and of every part liable to be injured. Carious bones must be laid bare, scraped, and then exposed to the escharotic effect of the red oxyde of mercury. Hardened callous edges must be removed, and the smaller sinuses laid open, so as to form one continuous cavity. If all this be not thoroughly done, it will happen, that, when the whole seems on the point of healing, a new tumour will suddenly appear, and frustrate all our hopes, which renewed abscess, in every instance, arises from some carious bone being left, or some diseased ligamentous portion remaining. In this way the expert operator, well acquainted with the anatomy of the parts, will combat the worst cases. We must, however, avoid an injudicious use of the knife, by which much mischief has been done. I have seen a direct crucial incision at the summit of the neck which divided the cervical ligament, and allowed the skin and muscles to recede beyond the power of surgery to unite them: and although it has been said that the application of our caustic means cannot be effectually made in very desperate cases without a division of the cervical ligament, and that this may be done with perfect safety, for that its principal attachment being to the dentata or second vertebra, so the head can be supported without it; this, however, is dangerous doctrine, and such division can only be warranted as a last resource; for a close examination of the head will shew, that this ligament does in some degree extend itself to the occipital bone also, where it evidently acts as a suspending agent to the head, and cannot therefore be cut away without some injury to its mobility and support: I would, therefore, recommend the junior practitioner particularly to avoid so wide a range, and first to try two moderate counter-openings, after the manner recommended and practised by French veterinarians†, which being made, should be kept open by means of large bands inserted wise within them; and which should be well soaked at each dressing same matter with which the internal wound is injected. This injection internal cavity should be made, if possible, twice a-day, and every second third day a full examination should be made by casting the horse, and renew all the former processes: but, of course, this only alludes to cases of great lignancy. One full examination and operation ought to be sufficient for ordinary cases. A very mild case is often sufficiently stimulated into action by fully injecting into it the terebinthinated tincture of cantharides, as it is called, liquid sweating blister. A more active escharotic than this be found in either of the following:—

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* The ravages this disease makes are sometimes extreme; it has been known to disease the occipital and parietal bones, burrowing around the ear, and has insinuated itself into the parotid gland. But some of its most direful effects are displayed when it erodes the articular ligaments, and effuses the purulent discharge within the spinal canal, and then produces paralysis. Hurtrel d'Arboval details a remarkable case of this kind, under *Mal. de Taupe*, *Dict. Vétérinaire*.

† Hurtrel d'Arboval is so explicit on the French method of operating for poll-evil, that I have introduced his description; and as that language forms a part of the education of almost every one now-

Nitrated quicksilver (*lunar caustic*)	one drachm
Water	two ounces.

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a-days, I do it in his own words:—'Dans toutes ces circonstances, il s'agit de procurer issue à la matière, en ouvrant le foyer ou les foyers où elle s'est amassée; il est même à-propos de le faire aussitôt que la collection est bien évidemment formée, attendu la facilité avec laquelle le pus fuse dans le mal de taupe. Il ne faut pas cependant opérer trop tôt, avant que l'abcès soit mûr; on s'exposerait à voir survenir des accidens analogues à ceux qui ont été signalés pour un cas semblable à l'égard du mal de garrot. En supposant l'opération indiquée, on s'y dispose en se munissant des instruments nécessaires, qui sont un bistouri droit, une sonde en S, un trois-quarts courbe (curved trochar), des pinces anatomiques, des aiguilles, des ficelles et des étoupes; l'animal étant ensuite abattu, on lui appuie la tête sur une botte de paille enveloppée d'une couverture, et on la lui place au plus haut degré d'extension possible, afin que les muscles extenseurs ou supérieurs de l'encolure ne soient pas tendus, et permettent l'écartement des lèvres des plaies que l'on doit faire. On est obligé ici de s'écarter un peu des principes ordinaires; il est de règle générale d'ouvrir un abcès de manière à ce que son ouverture corresponde au point le plus déclive, faute de quoi le pus ne s'écoule pas, l'abcès continue à présenter une espèce de cul-de-sac, et la matière se trouve retenue: mais, en ce qui concerne le foyer qui nous occupe, on ne peut pas ouvrir à la partie la plus inférieure, les vertèbres s'y opposant, on ne peut le faire que latéralement. La première incision se fait en plongeant le bistouri perpendiculairement sur la surface qu'il doit traverser, de manière que le tranchant soit du côté du garrot, suivant la direction du ligament cervical; on l'enfonce derrière l'apophyse transverse de l'occipital, dans l'intervalle qui existe entre la corde du ligament et le tendon du muscle dorso-occipital, c'est-à-dire à vingt-six millimètres ou un pouce de la crinière qui va gagner le toupet, car on ne peut se guider que sur cette distance pour l'incision première, puisque l'engorgement de la partie ne laisse plus sentir cet interstice. La lame de l'instrument étant ainsi enfoncée dans le foyer du mal, on prolonge l'incision de trois à quatre travers de doigt, ou autant que la circonstance l'exige. Si l'on a pénétré dans le foyer, une partie du pus s'écoule au dehors; dans le cas contraire, on pénètre plus avant. On en vient ensuite à introduire le doigt indicateur dans le foyer purulent, pour juger de sa profondeur, de l'état des parties, et reconnaître, s'il en existe, le nombre, l'étendue et la direction des sinus et des clapiers; s'ils sont en arrière, ils sont bien moins graves. Ils exigent des contre-ouvertures, pour que le pus puisse s'écouler librement, ce qui ne pourrait avoir lieu autrement, la première ouverture étant pratiquée supérieurement. Pour établir ces contre-ouvertures, on introduit la sonde en S dans le foyer, on la fait agir afin de soulever la peau et reconnaître la place où l'on doit inciser de nouveau, et cette nouvelle incision doit aussi être parallèle à l'encolure, et avoir une certaine étendue, pour que l'issue qu'on procure au pus soit large et facile. Il est quelquefois avantageux de se servir de trois-quarts pour pénétrer à la profondeur convenable et opérer les contre-ouvertures indiquées, qu'on agrandit ensuite. Cela fait, on déterge le foyer et les conduits, au moyen des injections; mais si l'on s'en tenait là, les lèvres de la plaie ne tarderaient pas à se réunir, sans que le fond du foyer se cicatrisât, le pus s'amasserait de nouveau, et l'on n'aurait rien fait: c'est pourquoi il importe de s'opposer à la cicatrisation de ces solutions de continuité, et l'on y parvient en engageant une mèche d'étoupes, qui doit sortir par les deux ouvertures, et qu'on renouvelle à chaque pansement. On en établit autant qu'il est nécessaire; cette méthode, comme celle des sétons, a le double avantage d'empêcher la cicatrisation et de servir de conducteur au pus; elle est incomparablement préférable à celle de prolonger les incisions dans toute l'étendue de chaque sinus, mode opératoire dont nous avons signalé les inconvéniens à l'occasion du mal de garrot. Mais si les sinus sont sur les côtés de la tête, sous les parotides, les contre-ouvertures sont très difficiles, et quelquefois impossibles à faire, parcequ'on peut risquer d'attaquer la glande (ce qui déterminerait une fistule parotidienne), de gros vaisseaux ou des nerfs; on est alors réduit à user d'une sonde élastique, telle que nous l'avons indiquée pour un cas analogue dans le mal de garrot, et si l'on *n'en retire aucun* bon effet, il faut considérer le mal comme le plus souvent incurable. On voit que *l'exécution de ces* opérations demande des attentions particulières et de bonnes connaissances anatomiques. Si des parties ligamenteuses, tendineuses ou musculaires, sont cariées ou en état de suppuration, il est de tout nécessité d'enlever les portions ainsi désorganisées. S'il y a carie de l'os occipital, on est également obligé d'enlever cette carie, ou d'en déterminer l'exfoliation. Pour parvenir à ces résultats, quelques praticiens conseillent la cautérisation, mais la cautérisation n'est applicable que sur les tissus osseux, encore avec la plus grande circonspection, puisqu'il s'agit d'un os qui concourt à former le crâne: la cautérisation des parties molles occasionnerait une tuméfaction inflammatoire considérable, que amènerait très probablement la gangrène. Il est donc prudent de recourir à un autre moyen, celui de l'ablution; mais en supposant qu'on tienne à l'application du feu, il serait indispensable de se servir du cautère à entonnoir, afin d'éviter d'offenser le muscle atloïdo-occipital, attendu son union à la capsule de l'articulation de l'occipital avec la première vertèbre cervicale. Souvent le mal de taupe existe deux côtés; alors, quand on a pratiqué l'opération dont nous venons de parler, on n'a fait que la moitié de l'ouvrage; mais comme, dans la première opération, l'animal perd beaucoup de sang, et qu'il est extrêmement fatigué tant par la perte de ce sang que par les douleurs qu'il éprouve, il est prudent de ne l'opérer que d'un côté à la fois, et d'attendre quelques jours pour reprendre l'opération.'

Or,

Muriated quicksilver (*corrosive sublimate*).........	two drachms
Water..	three ounces.

It cannot be denied that some cases which have foiled the veterinarian have been afterwards cured by a common smith or farrier, by the old method of *scalding*; which, though somewhat out of date in the new school, is but applying the cautery. When other means have failed, this, therefore, may be tried as a last resource; and although there is much apparent violence in it, yet humanity is less outraged than by continued escharotic dressings, cutting, and the poleaxe at last.

No. 1.—	Arsenic, very finely powdered............	one drachm
	Cerate of resin (*yellow basilicon*)	four ounces.
No. 2.—	Muriated quicksilver (*corrosive sublimate*), very finely powdered	one drachm.
	Cerate of resin (*yellow basilicon*)	four ounces.
No. 3.—	Caustic potash	one drachm, rubbed down with
	Oil of turpentine...........................	four ounces.

Either of these may be melted to a scalding heat, when, having secured the horse in a favourable position, pour it hot into the cavity, so as to penetrate all the sinuses. After the *scalding*, wait for the sloughs to separate, which will be in three or four days; then dress with any mild ointment; and if, after this, healthy matter shews itself, and granulations arise, a cure will proceed: but if the discharge again becomes ichorous, and the sore look unhealthy, at the end of a week or ten days from the first scalding, repeat it as before.

FISTULOUS WITHERS.

WHEN a saddle has continued to press on the withers, either by its ill fitting, its too forward placing, or other improper management of an incautious rider for a whole day, and the evil has, perhaps, been repeated the next, the consequence is frequently an inflamed tumour, which should be dispersed in the manner recommended in the former case: but if the heat and swelling remain stationary, or the swelling and tenderness should increase after discutients have been applied, then proceed to encourage maturation by the application of poultices, and as soon as fluctuation and softening of the tumour denote full maturation, do not wait its bursting, but open it on the affected side in the most depending part; or what will, I conceive, be preferable, pass a seton from the top to the bottom of the tumour: if it appear on both sides, place a seton on each of them. Should the attention be called to a case that has proceeded to a fistulous state, treat exactly in the same manner as with poll evil. Instances have occurred where the matter has penetrated under the scapula, and made its way to the point of the elbow or shoulder: in these cases a dependent orifice should be made, and a seton introduced through the whole extent of the sinus, for which purpose seton-needles of sufficient length are manufactured. This disease has also injured the dorsal spinous processes forming the withers: in any such case, exfoliation must take place before the wound can heal. Mr. Percivall is not any more than ourselves favourable either to caustic injections, or, as he justly terms it, 'the barbarous scalding:' but he advocates the propriety of laying open the cavity and exposing all the sinuses. 'Sinuses,' he further observes, 'may be laid open by incisions from without or within: the former with the scalpel, the latter with a bistoury, adapted to the wound and its course. On some occasions the bistouré caché will prove the most convenient instrument.' In Mr. Percivall's interesting and instructive description of these fistulæ he does justice to the treatment of these lesions by a method advocated by Mr. Alex. Gray, V. S. Edinburgh, who with a scalpel opened the sinuses, presuming there might be two, one on each side of the neck. He next dressed the wound or wounds, first by warm fomentations, and secondly with tincture of myrrh and aloes. Likewise in order to apply *pressure*, on which Mr. P., with great justice, rests much of his hopes of success, he had made for the purpose two pieces of wood, twelve inches long and three broad: each, be it observed, being thicker in the middle than at the edges, by which they appear to have been rounded off and then wrapped up in a long flannel bandage, four inches in breadth. Pledgets of tow were then applied over the wounds, and next one of the armed pieces of wood was placed on each side, and the whole was tightly bound over the fistulous orifices. The open sores were also dressed night and morning by fomenting and rubbing over them the tincture of myrrh with aloes. See *Hippopathology*, vol. i. p. 198.

Fistulous sternum.—Occasionally the point of the sternum also becomes so much tumefied by blows or pressure, as to proceed to suppuration: when here, likewise, a fistulous state of the wound is not uncommon. The *treatment* of this must be regulated by circumstances, but, on general principles, must follow the rules laid down for fistulæ in general.

SALIVARY FISTULÆ.

SALIVARY fistulæ are so little known in the horse, that, when a solitary case has been met with, it has been thought a monstrosity, and, as such, hardly admissible in our nosology: it is true that our indefatigable neighbours, the French, had some time acknowledged it; but as it became fashionable with them to introduce into their veterinary system parallel cases with every human disease, and which, by the by, has turned out to be not far from the very fact (so fast do they multiply on us), we were not always inclined to attend to their details so much, probably, as they deserved: but since communication has proved the frequency of occurrence of these lesions, as well among us as among them, we are surprised how they should so long have escaped particular notice. In the course of a long practice, however, I am not aware of having met with more than three or four cases of the kind: the first of these, I well remember, was consequent to a sabre cut received by a charger in an action on the continent, which I saw a few days afterwards. The second, I believe, was the result of strangles; and a third, if my memory serves me, was derived from the same source. These being seemingly but rare occurrences, led me to do little more than notice the existence and probability of future recurrence of those cases in my former edition. I have no minutes left as to what line of practice I pursued in either of them; I do, however, recollect, that I recommended the farrier-major of the regiment to fire the fistulous orifice in that originating from sabre cut, which succeeded; that in another I was altogether foiled, and the horse was sold in Smithfield. The third was taken from my care to go a journey into the country, and I altogether lost sight of him. I will now attempt to make up the deficiency of instruction on this subject, of the last edition, by offering the result of my own observations on it, with such as I may derive from other sources, particularly from that to which Mr. Percivall also owns he is indebted for much of a most valuable paper on the same, given in the first vol. of *The Veterinarian*, to which I would refer the reader for a more ample detail than my limits will allow of.

A fistulous parotid presents an unnatural salivary outlet, either in the substance of the gland, or of the duct itself, in some parts of its passage along the posterior angle of jaw, or in its ascent over the face. A fistulous orifice, where it is the effect of local abscess within the gland itself, or of the duct also when it has burst from obstruction, will be accompanied with ulcerative marks, as ragged edges, &c. But a recent wound in the gland will present, if it be a lengthened cut, a smooth wide gap, with serous moisture exuding from its general surfaces; and a flow of saliva from one or more of the salivary communicating tubes. A recent wound of the salivary duct itself will shew little more, at first, than the mere opening bedewed with limpid moisture, except at meals, when it will *pour* from it: this appearance soon changes, first to ulcerous edges, and at length into a true fistulous orifice; which will be minute as it extends up the face, but which becomes larger when the opening is in a dependent part, as the angle of the jaw: an old orifice attains an almost cartilaginous hardness. The salivary fistula may always be distinguished from any other by the nature and circumstances of the discharge, which is particularly plentiful after fasting, and will then be forced out in a minute stream; at other times it merely drops, or runs occasionally down the face. The fluid itself is semi-transparent, and slightly viscous; but, as observed by Hurtrel d'Arboval, not unfrequently, from ulceration in the gland, it becomes tinged with pus, and stained with a little blood now and then. These cases are usually the consequence of either accidental injury, of or abscesses resulting from strangles, angina, or catarrh. The *cure*, in most cases, is within our power, though it is a painful one for the animal; and as the saliva from a single gland, seeing there are three pairs which furnish this fluid, cannot be of much importance, and as by it we get rid of an inconvenient and unsightly appearance, we gain something and lose little: for in confirmed cases, as will be seen, it is only by the loss of the glandular functions and structure, and often of the substance also, that we are most likely to get rid of the blemish; in which case we only exchange one eyesore for another, certainly for a smaller, but, some blemish must still remain. It is not, however, certain that we shall lose the secreting office of the gland, for it can granulate and repair itself, both in the formation and the transmission of the salivary fluid; and when this can be done, there will remain then no question whatever on the propriety of attempting a cure. Such cases present themselves either when a simple puncture has been made into the glandular substance, or when an opening, the result of abscess, is left small and well defined, though evidently salivary and fistulous. Here the budding-iron, heated to a dull red, and forced into the orifice, will excite adhesive inflammation; and while the eschar is plugging up the salivary outlet, the granulations underneath will form, and make good the integrity of the whole. Should it not succeed at first, repeat it, and each time with a little more severity. A recent wound of the duct itself may be treated in the same way, bearing in mind, that though, in both cases, an adhesive plaister over a shaved surface with a compress will be useful, they will be here imperative. A salivary fistula likely to result from a recent wound of lengthened shape, or being irregular, or torn, may be treated by drawing the edges together by numerous fine sutures, placing immediately over the line of junction a strip of lint or tow moistened with compound tincture of aloes, the whole being then covered with an adhesive plaister[*].

But when a fistulous opening in any of the salivary glands or their ducts has existed some time, let its origin be traumatic or phlegmonous, we must in vain look to union by other means than granulation; we should therefore proceed to excite these by the application either of escharotics, or of caustics so called, or of the actual cautery or fire, according to circumstances. In the use of these, an eschar is attempted to be formed which serves as a temporary stoppage to the fistulous opening, and also to a breaking up of such diseased and callous surfaces as have hitherto stood in the way of a new formation[†], and which treatment, united with a compress judiciously applied, occasionally succeeds: but the continued flow of saliva is too apt to frustrate all these endeavours, and we must advert to other means. An ingenious method to meet these difficulties was put in practice by Hurtrel d'Arboval, which consisted in attempting to destroy the secretory function by *paralysation of the gland;* and which, though unsuccessful, deserves to be recorded in his own words*. Foiled, however, as he was in this, he attempted and finally effected a cure by *cauterization*, making use of an iron of large size at a white heat, which was so applied as to destroy the parts to a great depth, to produce extensive sloughing; the operation being again and again renewed until the end he wished for was obtained. Here, then, there appears a mode of cure, certainly violent and painful in the extreme, as well as somewhat hazardous also, but always effectual. Mr. Percivall has more lately succeeded in two cases wherein he acted on the principle of *destroying the structure of the gland altogether* (which was tantamount to M. d'Arboval's attempt at paralysation, but much more certain), and which, as before hinted at, may be done with little fear on the score of salivary supplies. To this end, he injected into the fistulous opening, in the direction of the duct leading to the parotid gland, a mixture of argent. nitrat. (lunar caustic) ʒss, acid. nitric. ʒi, water ℥i. This, in one case, produced a hardened non-secretory mass, but little larger than the other parotid, with, of course, a perfect healing up of the fistulous orifice. In the other, the end was equally gained, but it was by a lengthened process of sloughing, which eventually removed the whole gland, yet left only a 'trifling eyesore.' In France, a complete excision of the gland has been practised also with success: the operation is detailed in the *Récueil de Med. Vet.* vol. i, p. 133, as well as in the first vol. of *The Veterinarian;* the perusal of which, although it will probably leave the practitioner more favourable to the method of Mr. Percivall, will nevertheless afford much instructive material.

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[*] 'On doit d'abord apporter la plus grande attention, à la plus petite division arrivée à la parotide, et s'attacher à obtenir la réunion par première intention, soit à l'aide d'un emplâtre agglutinatif, soit au moyen de quelques points de suture. Il est ensuite nécessaire d'exercer une compression assez forte sur le corps de la glande pour empêcher la salive de se porter au dehors. Cette compression n'est pas très difficile à obtenir avec une boule un peu forme d'étoupe ou de filasse, soutenue par le bandage propre aux parotides, et dont on trouve la description et le dessin dans l'ouvrage de Bourgelat.' The difficulty of fixing any plaister is considerable, from the moisture exuding; but as there are periods of comparative dryness of the parts, as when the horse is not eating, a pledget of tow dipped into any adhesive plaister, melted and quickly placed over the whole surface, might be retained; but the emplastrum must not be of an irritating kind.

[†] An important caution may be gained from Mr. Percivall in this attempt, who observes, that, in making it, we are sometimes 'foiled in closing the fistulous aperture, in consequence of obstruction existing at the natural outlet of the salivary canal; at least, this was the case in the instance of a horse of my own, in whom the parotid duct discharged itself through an opening on the outside of the cheek, which we failed in healing up, in consequence, as it afterwards appeared, of *the closure of the natural termination of the duct.*' In human surgery, as observed by Mr. P., an attempt to remedy this would be made by passing a seton 'from the external fistulous opening through the cheek into the mouth, retaining it there until the internal as well as the external orifice had become

Fistulous maxillary and sublingual glands.—These cases are infinitely more rare than the preceding, but have certainly happened, both from phlegmonous inflammation of the substance of these glands, as well as stoppage of their ducts by the entrance of stones, oats, and other seeds, within the mouths of their ducts. In such a case, therefore, to effect a cure the obstructing matter should be pressed out of the duct, when the fistulous opening may be proceeded with on the principles laid down.

FISTULÆ IN AND AROUND THE ANUS.

Fistula in ano, though not a frequent affection now, yet does occur; and when the barbarism of making a secondary anal opening in broken-winded horses was in fashion, must have rendered these fistulæ much more common than at

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fistulous also; and finally healing up the latter by caustic.' There would be little difficulty in passing the seton, but a very great one was observed in retaining it, from the horse biting off whatever was placed as a knot: the ingenuity and perseverance of Mr. Percivall, however, overcame it, by the attachment of a flat metallic button without a shank to the inner end of the tape, which being confined close to the side of the cheek by a knot on the outside, prevented its being taken between the teeth. This certainly is an effectual method of introducing an established seton into the mouth: yet I much doubt, as does Mr. Percivall also, whether it might successfully apply to many of these cases.

* 'Il nous vint dans l'idée de chercher à atrophier la glande, à y éteindre la vitalité, et à la rendre impropre à la sécrétion de la salive, en imaginant un mode de compression tel que, en embrassent isolement la parotide en entier, on ne fût pas obligé de ceindre la gorge par un bandage qui serrât cette partie, ce qui aurait en de l'inconvénient sous d'autres rapports. En consequence nous passâmes verticalement dans l'épaisseur des tissus, de chaque côté de la glande, contre ce corps, et jusqu'à le profondeur qu'il doit occuper, une tige en fer, de la grosseur d'une plume ordinaire, contournee en arc et assez longue pour que, au moyen des bouts depassant au dehors, nous pussions opérer la compression à l'aide de plusieurs tours de lisse cirée qui cernait ue toutepart l'organe. Des mouvemens convulsifs de la tête et des etourdissemens nous avertirent que nous avoins intéresse des cordons nerveux; tandis que nous observions ces phénomènes accidentels, et que nous avisions à y remédier, nous nous aperçûmes qu'ils s'apaisaient, nous ne fîmes rien de plus, et une heure après l'animal était comme auparavant: la température de la partie s'abaissa, et il ne s'écoula pas un atome de salive tout le temps que l'appareil resta en place. Mais la partie située au-dessous, du côté de la tête, s'engorgea au bout de quelques jours; elle devint chaude, douloureuse, et nous fit bientôt craindre la formation d'un nouvel abcès. D'un autre côté, au bout de quinze jours, la lisse meneçait de couper la peau, et elle nous fit craindre la dénudation complète de la parotide. Ces considérations nous décidèrent à supprimer ce monde de ligature et à y renoncer.'

present; and the more so, if, as the French think, they often followed the first nick made in forming the *queue à l'Anglais*, but which effect I hardly remember to have seen from nicking: however, if their frequency is diminished, their notoriety is increased, as we now let slip no occurrence which the valuable herald of mutual communication can yield us. Constitutional fistulæ in the rectum are more common in carnivorous quadrupeds, from the constipated state of their bowels, and the nature of their food. Traumatic fistulæ, both in the rectum and around its verge, do occur, particularly from accidental violence committed by the ends of the shafts or poles of carriages, stable-forks, goads of horns, &c. &c.: there are also occasional constitutional sources of anal fistulæ. In cases arising from external wounds, the penetrating instrument may enter by the side of the anus, and end within it, in which case it forms what is called a *complete* fistula in ano; as it would be an *incomplete* or a blind fistula when it penetrated the cellular substance around the gut only*. A case of the latter kind is related by Mr. Percivall in *The Veterinarian*, vol. ii, which was judiciously and successfully treated by means of a mixture of sulphuric acid and sulphate of copper made into a paste, and introduced to the bottom of the sinuses, for there were two. An *internal fistula of the rectum itself* might pass unnoticed some time, and would probably be, at last, detected only when too late, by the constitutional disturbance, constant evacuation of purulent matter with the fæces, and great pain in ejection of them.

As regards the *treatment* of these cases, it has been seen that the brute resources are such as to require, in instances of incomplete or external fistulæ, little more than the application of some stimulant to the bottom of the wound, to encourage a healthy healing action. But when the rectum itself presents a fistulous communication with the external opening, or itself has an outlet into the cellular tissues around it, although similar means with those already noticed may be tried, there is little hope that a cure can be obtained but by an operation; and which will be equally imperative when the fistula is incomplete also, provided it has resisted hitherto all milder treatment. It will be the express intention of such an operation to lay the fistulous cavity within the cellular tissues and that formed by the rectum into one, by which we shall have an open sore, instead of a hollow sinuous one; and it will be hoped to thus bring the parts into a stage for general union. A probe-pointed bistoury of sufficient length, or otherwise one attached to a long handle, must be passed up the fistulous orifice by means of the right hand, while the left hand, well oiled, must be passed up the rectum, having the middle finger sufficiently guarded, the exploration being made with the fore finger, which will enable the operator to divide the hollow on the guard of the middle finger, from its utmost extent to the verge of the anus. When there is no opening in the intestine, a concealed pointed instrument may be made for the purpose; or the finger, forced against the edge of the bistoury, will make one: and if there be already an opening, the instrument will find it. This done, introduce some lint or other light matter between the edges of the wound and into the sinuous hollow, which may hereafter, in case union does not go on kindly, be moistened with some mild stimulant.

Fistulæ in the perinæum or in the track of the *urethra* are liable to occur after lithotomy, and tapping the bladder or passing the catheter. The treatment is rendered complex from structural peculiarity, and also from the little command we have over the horse: many of these cases, however, heal up spontaneously months and weeks after they have been despaired of. On a fistulous cavity consequent on the puncture of the bladder through the rectum, or by a spontaneous opening taking place, Hurtrel d'Arboval observes, 'Autrement la fistule vésicale vient s'ouvrir dans le rectum, à la suite d'une blessure ou d'une ulcération spontanée. Les sondes de gomme élastique seraient sûrement ici d'un grand secours, en supposant qu'elles pussent donner issue à une quantité assez grande du liquide urinaire; mais elles sont d'une bien faible ressource dans les animaux, parcequ'on ne peut ni les laisser à demeure, ni les introduire fréquemment, l'animal malade ne se prêtant pas à cette introduction, et ne pouvant supporter le séjour prolongé du corps étranger; c'est ce qui fait que ces fistules sont incurables.'

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* In thus using the term *fistula*, it is to be understood I am only uniting the cause and effect, for convenience. When these openings happen by violence, they are often, indeed commonly, to be healed up as simple wounds, by adhesion or granulation: I here therefore presuppose that they have become fistulous by a morbid change, in which a healing process appears still day by day more remote. I must also observe, that we should fall into an error were we to denominate every phlegmonous opening near the anus by the term fistula; and it would be bad surgery to treat them as such. Mr. C. Percivall was, therefore, justified in considering the case above hinted at first as phlegmon, or as called, according to its locality, a *phyma*; and so to treat it. Neither does he appear to have altogether altered his views of it afterwards, or he would probably have proceeded by section; whereas he simply stimulated the sinus, and recovered his patient without risking him by a hazardous operation, and which distinctions I would impress on the junior practitioner's mind.

QUITTOR, CANKER, THRUSH, FARCY-BUDS, and GREASE, are examples of diseases referrible to Classes XII and XIII: but it is most convenient to treat of them with other morbid affections of their several localities.

CLASS XIV.

INFLAMMATORY INTUMESCENCE, WITHOUT ULCERATION.

MEMBRANOUS AND LIGAMENTARY LESIONS, CALLED SPRAINS.

UNLESS we were allowed to destroy a vast number of horses with sprains in every stage, and of every part, we could never define this injury so accurately as to defy criticism. It is said to be not an unnatural distention of parts, but a rupture or division of the cellular membrane which connects these parts, or is intermingled with their structure: it is at the same time held that the injury which tears through this does not put these tendinous and ligamentous parts on the stretch, because we are told that they are not capable of either distention or contractility. Wood, iron, stone, and even glass, are capable of contraction and distention, yet ligament and tendon are incapable of it; so we are told at least. But, with great submission, we do firmly believe that these organs can and do suffer extension, and that, during the violence committed in putting their structure on the stretch, both the internal cellular tissue, and that which surrounds or connects them with other parts, is ruptured, and, with it, an infinity of minute vascular nervous and capillary absorbing vessels are ruptured; from whence we are at no loss to account for the distention which follows the effusion; the pain and exquisite tenderness consequent to the laceration of nervous twigs; nor the difficulty of promoting immediate absorption, when the capillaries have suffered in common with the rest of the parts. Such I believe to be the rationale of ordinary sprains or strains: but there are extraordinary, or rather more severe effects which follow sudden exertions; such as violent efforts of the muscles to restore the equilibrium endangered by a slip or slide. Here I can suppose that the fibrous structure itself of the ligaments, thecas, and even the tendons, may be unnaturally distended beyond the power of immediate contractility, or their minute and intimate connections broken through beyond instant repair. Now and then there is superadded to these some lesion of the connecting ligaments, or the sheaths of the tendons, or the aponeurotic expansions, which bind the tendons together in masses and conjoint actions. We shall now proceed to trace the *symptoms*, *consequences*, and *treatment*, under these grades of intensity of injury. It is probable that the slightest sprain produces some lesion, however minute: and this, of necessity, causes inflammation to repair the injury, and take up the effusion; we therefore always find heat, tenderness, and lameness as accompaniments of the slightest affection of this kind; but which a few days, or even a few hours, of rest is sufficient to repair the breaches of, and, the cause being removed, the effects will cease: rest is the remedy, and Nature has then time to work her own cure; but work the animal, and much more time, with artificial aids, will be required to restore the parts. If greater violence has been committed, greater re-action will take place; the effusion will be considerable, and consequently the tumefaction great; the heat, pain, and tenderness excessive; and the animal will hardly put the limb to the ground: he now loses his appetite, falls away, and presents every indication of symptomatic fever. If judicious means are, however, adopted, these symptoms gradually disappear, and, after a considerable interval, the parts are reinstated in their original integrity by absorption of the extravasation, and close apposition of the ultimate fibrillæ in their original order. If injudicious means are adopted, and the inflammation be increased by exercise, or by the application of stimulating oils, &c. &c., as is too commonly done, the adhesive matter thrown out is great, and, the engorgement being too extensive for the work of absorption, remains, and becomes organized into a permanent induration, which interferes with the motions of flexion and extension, rendering the future action of the horse imperfect and painful probably ever after. When laceration has extended itself into the sheaths, all these evils will, of course, be aggravated; and although judicious treatment will restore a moderate degree of utility to the limb, the repaired parts will shew their juncture and consolidation by swelling.

The *treatment* of sprain or strain, in whatever part it occurs, must be essentially the same, and the differences required are rather mechanical than medical. There are two indications which present themselves, which are, to overcome the inflammation; and, next, to restore the disintegration which may remain from want of sufficient powers of life, in such parts as ligamentous and tendinous expansions. A mere muscular extension will be followed by considerable inflammation, the removal of which will often leave the limb sound. But it is otherwise when the parts we have named (i. e. ligamentous and aponeurotic) are the principal sufferers: the vascular action itself will less easily give way; and even when it does, will yet leave much enlargement and much weakness in the part. Both cases, and indeed every case of sprain, should be commenced by local depletion (and violent, by general depletion also). If the injury be anywhere between the knee and foot before, or between the hock and foot behind, draw blood freely from the toe, and, to encourage the flow, place the foot into warm water. This done, bury the part in a saturnine poultice, or surround it with cloths constantly moistened with a solution of acetate of lead, or of Goulard's extract; the constant evaporation of which will carry off much of the heat and irritation of the part, and thus greatly tend to moderate the vascular action. Absolute rest is indispensable; and constitutional means, as open bowels, cooling diet, and pure cool air, will assist the local means. So little are we masters of the mode by which medicaments operate, that we find beneficial results from matters apparently diametrically opposite. It is sufficient that we do know it, to render it prudent that we try these opposites, carefully watching for the time, when the inefficacy of the one is apparent, to immediately proceed with the other. It is thus with the treatment of the inflammatory stage of strains by warm applications, which sometimes succeed better than cold ones. I have thought of these treatments thus: in summer I have fancied that the inflammatory action yielded best by the cooling plan; and in winter to the fomentations with warm water or poultice. I have also commenced, in violent cases of tumefaction and heat, with the cold, and, after three or four days, I have fomented to encourage absorption, which I have afterwards made give place to tonic bathings of muriate of ammonia with equal parts of vinegar and water. When the tumour is well defined, and some ligamentary lesion is suspected, a saturnine poultice around the part, maintained within a cotton stocking, is a useful application. The active part of the inflammation having subsided, our attention must be directed first to promote absorption of the adhesive matter deposited by the inflammation, which, should it remain, would prove a source of irritation and lameness, by preventing that approximation of the ultimate fibres that is necessary to the strength of the part. This indication is best fulfilled by excitants to the absorbents, as mild friction, regular and elastic bandaging, and bathing with mild stimulating washes, as zinc infused in proof spirit and distilled vinegar, camphorated spirits; vinegar in which mustard has been infused; or any other exciting liquid application. Much good will be derived from bandaging the limb with some matter possessing elasticity, and which should be first only of moderate tightness, but may be gradually drawn tighter as the tension lessens: nothing tends more to strengthen the part or remove the deposit than the proper application of a supporting bandage. If induration and lameness remain, blister, and then turn out with cows or sheep, but not with other horses, or the racing about may do more harm than good. Very desperate cases of continued lameness and obstinate induration may be fired, both to form a permanent bandage and promote absorption. Such is the general treatment of membranous and ligamentary extension and fibrous lesion, which is equally applicable to all the various articulations that become subjected to such violences. I shall now only apply them to the individual parts more particularly liable to these injuries.

SCAPULO-HUMERAL EXTENSION, OR SHOULDER SPRAIN.

What is now generally known by the term *shoulder sprain*, appears to consist in an unnatural extension of the muscular or ligamentous parts which operate the motions of the scapula and humerus, and particularly of those which serve to sustain and connect the former with the body; and which parts, it must be evident, are very liable to this kind of injury, from the great extent of motion the shoulder-blade enjoys forward and backward, and its close confinement laterally. *Shoulder strains* are, therefore, frequently the consequences of a side wrench, or slip, which, by separating the fore legs too widely, puts these parts suddenly on the stretch. The adductor muscles, as the serratus major, are very frequently the sufferers on these occasions: sometimes, however, the ligaments of the articulations, both scapular and humeral, are principally affected. Mr. Percivall attributes it rather to an affection of the tendon of the flexor brachii; Barthelemy, on the contrary, believes it more often exists in the scapulo-humeral articulation; and as I have known it exhibit its principal seat in that between the arm and elbow, we may suppose it may take place, according to circumstances*, in any of these vicinages, but is most observed in the tendinous and ligamentous connexions of the adductors of the shoulder. Shoulder sprains are, however, not of such frequent occurrence as supposed; for farriers and persons about horses are apt to attribute every lameness they do not exactly understand, and whose seat is not self-evident, to an affection of the shoulder: and when, on viewing a horse in front, the muscles of one or of both shoulders appear wasted, it requires more than usual exertion to make even intelligent persons believe that the evil did not originate where its effects are so evident. Such appearance is nevertheless no proof of such seat; for in all affections of the feet, where there is much pain and lameness, and the animal consequently indulges in much rest, not only the external, but the internal muscles of the shoulders waste: this draws the fore legs closer together, the spine of the bladebone becomes prominent, and the whole substance seems lessened, as well from inaction as from the irritation of disease, which disturbs the healthy functions of the part. It is very necessary, therefore, to be able accurately to distinguish a *sprain in the shoulder* from the numerous affections with which it may be confounded, not only between affections of distant parts, where only the grossest ignorance can prevail, but also between the different portions of its own vicinage; for as the one or other of these are affected, so the leading features drawn from singularities in the lameness, which are much depended on, will vary. In all of them, however, it appears to occasion extreme pain to the horse to extend and advance the leg, for which reason he drags the toe along the ground, and having rested the limb, he drops considerably, and again catches it up quickly. Mr. Percivall says, little pain is felt in walking, which may be *sometimes*, but is certainly not *always* the case: on the contrary, I have at times found the difference between walking and trotting, compared with the different exertions required, not great. These cases are especially characterised by the extreme difficulty with which a horse moves down the slightest declivity, from the weight being thrown on the shoulders; and also by the rotation of the extremity, in which the horse, when in motion, swings the leg round in a remarkable manner: in fact, he evidently attempts to move the limb in any direction but that in which elevation of the shoulder must take place. At rest, the limb is generally thrown forward in a relaxed position, resting on the point of the foot: and this will particularly serve to distinguish it from affections of the feet, in which, though the whole limb may be carried forward and the toe be *pointed*, yet the leg will be set straight out, and not relaxed; neither will it rest on the toe, but on the entire foot. When the injury is principally felt in the muscular attachments of the scapula with the arm, if pressure be made between the fore leg and chest, in the direction of the serratus major, and other attaching muscles, the horse will flinch considerably; and as a further mode of distinguishing this affection from those of the feet and other parts, if the foot be elevated forward considerably, and the whole limb at the same time brought out into a straight line, it will give intense pain if the shoulder be the seat of lameness. The immediate seat of the affection itself is in recent cases sufficiently well marked by the heat and tenderness of the immediate part; there is, however, not always much tumefaction present in these instances.

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* 'Dans certains cas, suivant la direction dans laquelle le membre a été porté, il peut arriver que ce soient les muscles extenseurs de l'avant bras qui aient souffert, qui aient éprouvé la distension; il y a alors boiterie très forte; mais les muscles qui vont de l'épaule au thorax n'en sont pas moins dans un état parfait d'intégrité; or, si ce sont les muscles extenseurs de l'avant-bras qui ont souffert, ils sont dans le relachement. Aussi le bras, bien loin d'être tendu, est demi-fléchi; de sorte qu'il est incliné de haut en bas et d'arrière en avant. L'animal marche dans cette position, parceque la contraction dans les muscles extenseurs est devenue impossible, soit à cause du tiraillement qu'ils ont éprouvé, soit à raison de l'inflammation qui s'y est développée, soit parceque cette contraction occasionne des douleurs vives, soit peut-être pour toutes ces raisons à la fois. Si au contraire la lésion principale existe à l'articulation scapulo-humerale, le membre reste dans son état naturel; mais, pendant la locomotion, l'animal ne fléchit qu'avec peine les articulations, comme cela se fait aussi remarquer dans le cas précédent, et le membre est plutot trainé en avant que porté. Le jeu des articulations de la jambe lesée est encore plus gêné, et peut même être regardé comme nul. Si l'on contraint l'animal à reculer, le membre est alors tout a-fait trainé d'avant en arrière, et quelquefois l'animal se refuse à cette action. L'un et l'autre phenomènes sont d'autant plus marqués que l'accident est plus grave; c'est parceque l'animal ne peut fléchir le membre, qu'il lui fait décrire une arc de cercle en dehors quand il faut qu'il le porte en avant: on dit alors qu'il *fauche*. Les autres symptômes sont la douleur que l'animal éprouve généralement quand on comprime avec force le pourtour de l'articulation scapulo humérale, ou les masses musculaires intéressées dans les fosses sus et sous-acromiennes, et quand, levant le pied et fléchissant la partie inférieure du membre, on fait exécuter aux regions inferieures des mouvemens en tous sens. De temps en temps, pendant le repos l'animal se soulage en diminuant l'appui sur le membre malade, qui se trouve alors porté en avant. Quelquefois aussi, après un certain temps d'exercice, après que la partie est ce qu'on appelle vulgairement *echauffée*, la claudication est moins sensible: mais elle reprend bientôt son degré de force après quelques momens de repos.'

Treatment.—When by the heat, tenderness, and lameness, there is reason to consider the injury serious, and the inflammation great, particularly when the case is at all recent, it will be prudent to draw blood from the plate vein. Let the parts be kept constantly well wetted with Goulard's wash, which, if it fail to mitigate the heat, change to warm fomentations applied three or four times a-day, for twenty minutes each time, carefully rubbing dry afterwards. In these instances, when the heat and tension are not very great, although the case is recent and the lameness considerable, there will be reason to consider the ligaments as particularly affected, in which cases insert a rowel in the chest, in addition to the other treatment: it may be that the ligaments of either the shoulder, or of the arm or elbow joint, may be the seat of the strain; and which of them it is, a careful examination will detect. If the affection appear in front towards the point of the shoulder, invest the whole circumference of that part, as soon as the more active symptoms are removed, with a blister. If the junction of the arm with the fore arm be affected, blister also; but when the evil is evidently seated in the muscular parts principally, which, as before noticed, is known by the inner side of the arm being tumid and tender, I would recommend the following practice, which I have long pursued in these cases with invariable success. As soon as the more active inflammatory symptoms are abated, I proceed to raise an artificial inflammation by the free use of stimulants, generally of the liquid blister, in the following manner: Mix six ounces of common oil with two or three ounces of liquid blister (see *Mat. Med.*), and with this rub the whole affected part twice a-day, until the swelling and inflammation it will bring on prevent the use of more. In two or three days these will subside, when it should be repeated, until the same effects again prevent the application. In this way keep up a mild inflammation for a week or ten days, according to the original violence of the affection: in general cases, the subsiding of the second swelling will leave the horse sound. This will be found a much more efficacious mode of practice than the common blister; but it must be particularly remembered, that I know of no affection so liable to return as this; consequently, although the horse may appear sound, it will be very dangerous to put him to immediate work: on the contrary, it will be more prudent to turn him out to grass, if possible alone, or with cows only. otherwise, by playing and galloping with others, he may renew the injury. Swimming a horse for shoulder strain is a very common remedy among the old farriers, under a supposition that dislocation has taken place; but the opinion and the practice are equally founded in ignorance, and the consequences must be injurious. Another custom, little less unsurgical, but not equally hurtful, is the old-fashioned mode of *pegging* or blowing in of air around the shoulder, as butchers blow up veal, which, by exciting inflammation may do good, though less certainly than any other stimulant.

Blows on the point of the shoulder.—These injuries occur more frequently than strains, and are often productive of more present lameness, and eventually of consequences more serious. Turning suddenly in a narrow stall, running against a hard body, or being kicked, or violently struck, may any of them occasion it. There will be great tenderness and heat at the point of the shoulder, some swelling, and the lameness will be extreme. In such cases bleed in the plate vein; insert a rowel in the chest; foment the part; and, when the heat and swelling are reduced, blister repeatedly: combining with the after-treatment rest and *quiet* turning out.

EXTENSION OF THE FLEXOR TENDONS, THEIR SHEATHS, AND LIGAMENTOUS CONNEXIONS.

A *sprain*, *strain*, or *clap* in the *back sinews*, according to the phraseology of farriers and horsemen, is a very grave and serious evil. It is probably often accompanied by laceration of some of the ligamentous fibres; there is, however, no doubt but that it may be occasioned by a simple distention of the sheaths of the tendons, and even of the tendons themselves; although these latter cases may be rarer than the former. It is more frequent in the fore than the hind legs; but it may and does occur in both. It is the result of some violence which acts suddenly on the limbs, as downward leaps, attempts to recover a false step, treading unevenly on any hard and prominent substance, &c. It is also occasioned sometimes by lowering the heels too much and too suddenly, by which they are put unnaturally on the stretch. The injury received brings on inflammation, with its accompaniments of heat, swelling, pain, tenderness, with an incapability of extending the limb. The effusion from the inflamed vessels, which probably at first is more purely serous than adhesive, is therefore more readily reabsorbed; but if the inflammation continue, or exercise or improper applications be made use of, coagulable lymph may be thrown out, which, not being so readily absorbed, may eventually form adhesions between the tendons and their sheaths, through which they should naturally slide free and uncontrolled by means of the synovial fluid interposed between them. It is these effects of adhesive inflammation that form those permanent callosities around the back sinews, which so frequently follow these accidents, and which, by obstructing the freedom of motion, occasion a lameness much felt after very hard work, and likewise at first starting to exercise; but which decreases as the horse proceeds, motion lessening the irritability, and other objects engaging the attention. The absorbents are by this means stimulated likewise to remove a part of the deposit;

and it being therefore observed that he is not only less lame when exerted, but also less swollen, it has begat an opinion that horses with old strains may be *worked sound*. It would be as humane and as reasonable to drive the crippled soldier with one leg until the other grew.

The *treatment of thecal and ligamentous distention* or sprain should follow the general rules already laid down. The local inflammation must be promptly combated by bleeding in the plate, or thigh vein, according as the injury is before or behind; or blood may be drawn from the toe with great propriety. Warm fomentations, in the very early stages, particularly when the tumefaction is very considerable, will tend to unload the vessels; and the same indications will be likewise followed by large poultices, or by immersing the whole limb in warm water. In two or three days, change this plan for a Goulard poultice or embrocation, and continue the same until the heat and tumefaction have nearly subsided. Any treatment more stimulant than this in the early stages only tends to increase the deposit of lymph, and to organize it into a permanent tumour: how much more erroneous, therefore, is it at once to blister these lesions directly they take place, as is sometimes practised. But when the active stage of the inflammation has subsided, then mildly stimulating and tonic applications are proper, according to the notices already given, and they should be accompanied here with due friction and bandaging, which will assist in promoting the absorption of the lymph deposited, and prevent the cellular membrane from becoming irretrievably thickened, or the sheaths of the tendons obstructed in their motions around them. The recovery from a severe case is usually very slow: the parts being ligamentous, as already observed, do not readily reinstate themselves; the after-treatment must, therefore, fully accord with this view, which is that of giving *sufficient time* for that purpose, which in most cases ought to be some weeks even after the horse may, on moderate exercise, seem sound; for, except in very trivial cases, it is not often that the parts are really so reinstated as to be equal to continued exertion. It is always, therefore, better, even in the most favourable cases, to give a few weeks' rest, using a roller or laced stocking round the part, frequently wetted with a cold astringent wash. It will aid the process, as well as keep the horse in health, if he be turned out without the company of other horses, and where he may have a shed to shield himself from flies; or the stamping and resistance he will make to these tormentors will do more harm than good. Where the induration remains obstinate, repeated blisters are the best means of promoting a removal of it[*].

OVERREACH,

Is a *blow* inflicted on some part of the fore leg by the hind foot; frequently it strikes the flexor tendon, and produces inflammation and tumour, sometimes of considerable magnitude and consequence. The treatment must be similar to that just described: in future, place the hinder shoes rather more backward.

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[*] Blistering is preferable to firing in these cases; for we can repeat it as often as we please, and both blistering and firing act in the same way; nor is firing ever to be recommended until blistering has been fully tried, but failed; then, as a more active blister, it may more powerfully stimulate the absorbents, as well as, by permanently corrugating the skin, it may become a perpetual bandage to the weakened parts. A medical friend of mine had his only and valuable horse injured by a hasty step on a stone, while playing on the road unridden. The consequence was, some little heat and tumefaction under the knee and some lameness, for which I directed him to be confined to the stable, and fomented with warm water. In a few days this was changed for saturnine washes, and then for more discutient applications. He was also bled and physicked, but in three weeks little progress was made, and the lameness, which was never considerable, remained the same, with some heat and very slight tumour, from whence I judged there had been some slight laceration of ligamentous fibre, but not extensive distention of tendons. I now recommended him to be blistered, which was done, and the horse turned out: but at the end of two months was only slightly amended: he was therefore blistered again, and a third time also, with little alteration; yet I still requested my friend to persevere, and the consequence was, that he was kept at grass and blistered, in all seven times. At the end of six months, and not before, the limb was perfectly restored, and remained sound as long as I knew him; and though there is nothing singular in this, I detail it to shew how necessary it is often to continue the means of cure in obstinate cases sufficiently long.

RUPTURE OF THE SUSPENSORY LIGAMENTS.

Breaking down is the name given by farriers to this accident, and which now and then happens to young horses in breaking, and more frequently to others in training. It has been often mistaken for a rupture of the flexor tendons themselves; but it is very seldom, indeed, that this accident happens to the horse: the immense strength of these organs very seldom indeed admits of their rupture from the exertions of progression; but their connecting and suspending ligaments, and the tendinous thecæ surrounding them, being weaker, are occasionally broken through. The limb, in these cases, betrays its loss of support by the fetlock being brought almost to the ground: but the horse can flex his foot after he has raised it, which is not the case when the flexor tendons or back sinews themselves are torn through. A perfect cure is very seldom obtained, but, as the horse may be made sufficiently useful for some purposes, so it should be always attempted, first by reducing the inflammation by the means already indicated; which beginning to subside, the toe should be somewhat flexed by an elevation of the heel by a heeled shoe, or by the application of splints purposely crooked, within which the leg should be firmly fixed, to prevent the laceration of that intermediate substance which will be thrown out to unite the interstices of the ruptured ligaments, which will greatly assist the limb in regaining its functions. A laced stocking, or firm bandage, should also be kept on afterwards, until all is firm and some strength is gained. Firing at this period is very useful, as it applies a permanent bandage to the part.

RUPTURE OF THE FLEXOR TENDON, OR BACK SINEW.

THIS, as observed, is a very rare occurrence, the former injury being often mistaken for this: it has, however, happened from great violences committed: the general *treatment* will be that just detailed, except that, in the rupture of the suspensory ligament, the flexion or bending of the limb below the pastern only would be strictly necessary; but here it would be essential to flex the whole limb from the elbow downwards, and to keep it constantly in that state for some weeks, which could alone be effected by partially slinging the animal, and the use of proper splint apparatus, in which case it is probable a tolerable cure might be effected, and probable only; for so few horses can be kept in even moderate quietude by slinging, that it is very seldom we derive the benefit we hope from it. It would in a case of this kind, were a practitioner so inclined, be of little use to attempt to approximate the ends, or to retain them by sutures or stitches. The only method would be to bring the divided ends as near together as possible by permanently flexing the limb by means of crooked splints, as already hinted at; so that the adhesive matter thrown out between the divided portions should flow in a right line towards each other, trusting to Nature for the rest: and it is truly surprising to see what efforts are frequently made to repair the effects of very violent accidents.

Crooked limb from this rupture, and sometimes also from the former, has taken place from too continued a perseverance in flexing the limb, and sometimes from the extent of the adhesive inflammation itself; and in others from contraction of parts themselves. Modern surgery has relieved these cases by boldly dividing the flexor tendons.—See the method of doing this among the other *Operations.*

RUPTURE OF THE EXTENSOR TENDONS.

Extensive lacerations have been known to divide the extensors of the pasterns and feet both before and behind; and in such cases we do not now, as formerly, destroy the horse, but, trusting to the astonishing powers of the constitution in repairing accidental breaches, we assist nature, not by officious interference, but, placing the divided portions in apposition, we bind up the limb, with due regard to the local and constitutional inflammation likely to occur, and thus we effect a cure.—See *The Veterinarian*, vol. iii, for cases so treated. The following case, recorded by Mr. Spooner, one of our best veterinary practitioners, will illustrate both the practice described and the results:—'On the 16th of August, 1829, I was sent for by a respectable farmer to attend a young cart horse, that had met with an accident about three or four days previous. I found a very large wound situated between the knee and elbow joint, about six inches above the former, and towards the anterior and external part of the fore arm. It was occasioned by the crook of the trace getting entangled in the horse's leg, whilst the carter was letting his team go out of the road to a pond to drink; and as there were several horses before this one, every step they made lacerated the arm the more. The wound was nearly as large as my hand, and the extensor-pedis was completely divided, just below the part where it becomes tendinous. About two or three inches of the lower portion of the tendon were detached from the neighbouring parts, and hanging from the inferior border of the wound, and the extensive granulations that had formed must have caused or assisted its protrusion, as it was not observed until the day before I was sent for. The horse appeared to be in pain, had great difficulty in moving, and dragged his toe along the ground at every step. I despaired of ever getting the divided tendon to unite; but, however, I was willing to try what Nature would do. Accordingly, I drew the ends of the tendon as near together as possible, and, having connected them by sutures, supported the lower detached portion with bandages: the wound was cleansed, and the granulations touched with a mild escharotic. The next day, finding that the ends of the divided tendon had still further receded from each other, the sutures on the stretch, and, in short, no prospect of a re-union taking place, I resolved to excise the lower portion, trusting the functions of the limb to be performed by the *extensor suffraginis*. I therefore amputated the protruded portion of tendon, and, having stopped the hemorrhage with the cautery, sprinkled the wound with a caustic powder, the fungous flesh having risen above the level of the skin, so much so, that no trace remained of the place the tendon formerly occupied. Cathartic and diuretic medicines were occasionally administered internally; but the only topical treatment afterwards employed was an astringent and an escharotic powder, scattered over, as the wound required. The horse moved better as the wound diminished; and in about six weeks after the accident, the parts being completely cicatrized, he resumed his work, with a slight scar marking the seat of injury, but without any lameness or impediment in his action.'—*Veterinarian*, vol. iii, p. 73.

EXTENSION OF THE LIGAMENTS OF THE FETLOCK JOINT.

A Sprain of the Fetlock Joint arises from some injury done to the ligamentous and tendinous connexion of this part, either from long-continued exertion or from more momentary but violent efforts. The effect immediately produced is, heat and swelling in the part, accompanied with great lameness, pain, and tenderness. When it occurs behind, it is sometimes mistaken for common swellings arising from œdema, particularly when the accompanying lameness be not considerable. I have seen cases where horses have continued to be more actively exercised to take down the enlargement; until the increased inflammation thus occasioned has forced the vessels to deposit coagulable lymph, which, becoming organized, could never be removed, but what is called a *callus* remained ever after. The *remedial treatment* must be the same with that of other sprains.

EXTENSION OF THE LIGAMENTS OF THE COFFIN.

A Sprain of the Coffin Joint is not an unusual occurrence; and, like the former, consists of violence applied to the tendinous and ligamentous connexions of this joint. When a horse becomes suddenly lame, and attentive examination can discover no injury above, the feet should be closely examined, when it is very probable there will be found in one of them some tenderness, and perhaps swelling, particularly at the back part, towards the upper portions of the heels, and in the neighbourhood of the navicular bone, where the part will be more hot than the others, and the horse will express pain when the foot is bent or extended, and he will generally also, though not always, *point* the foot when in the stable, or, as it is expressed, will stand *favouring**. The *treatment*, if the heat be considerable, would be to put the whole foot into a Goulard poultice for three or four days: in very bad cases I have thinned the whole crust of the hoof, and have drawn blood from the toe with advantage. After the heat has in some degree subsided, blister, as a milder treatment will seldom avail here: frequently it must be repeated also.

STRAIN OF THE LIGAMENTS OF THE FEMUR, WHIRL, OR ROUND BONE.

As chestfounder covers all the other defects of the fore limbs, so lamenesses behind are all referred, by the older farriers, to either a strain of the round bone, or of the stifle, as their fancy leads them to favour the one or the other. Violence may, however, and certainly does, occasionally injure the ligaments of the articulation of the thigh with the pelvis. Here the *treatment*, from the deep situation of the part, must necessarily be attended with some difficulty. It will be proper to foment the part, if the pain and tenderness are considerable, or the tumefaction great, which latter, however, is not often the case: otherwise, apply first saturnine lotions until the more active symptoms give way; then resort to discutients, and next actively stimulate, or at once lay on a blister, which should be repeated also. A seton, if the blemish be not minded, might be applied opposite the articulation with benefit. As a last resource, fire over the joint in a star-like form: in a few days apply a charge of pitch and crocus metallorum or minium, and turn out for two or three months.

SPRAIN OF THE LIGAMENTS OF THE PATELLA OF STIFLE JOINT.

The ligaments of the patella, or of the articulation between the femur and tibia, called the *stifle*, may be occasioned by some lesion in their structure, by over-exertions, or by accidental violence, as blows, &c. As the former affection may be distinguished by a peculiar *dragging* of the limb, this may be known by the *circular direction* in which the leg is carried, during motion, purposely to avoid flexing the joint. The heat and tenderness are, however, of themselves sufficient to guide the practitioner in this instance. Sometimes the muscles of the thigh, and not those of the joint, are the seat of the injury; in which case, the tenderness will be found within, towards the groin, and not around the patella or stifle. In *treatment*, however, this affection in nowise differs from the former, except that sometimes a rowel withinside the thigh has benefited this, but is inapplicable to the other. For the former, repeated blisterings and absolute rest are the best remedies.

CURB, OR EXTENSION OF THE LIGAMENTS OF THE HOCK.

This is usually brought on by some violence offered to the ligaments of the hock, or of the sheath of the tendons passing from the hock downwards, as of the flexor perforans. It is often the effect of leaping, rearing, kicking, &c. and as such is usually sudden in its appearance. A kind of predisposition to curbs from conformation is apparent in horses with *sickle hams* (i. e. distorted). In these instances, all the parts must be constantly on the stretch to establish a perpendiclar line of bearing, which this form interrupts. The lameness arising from curbs is not, in general, severe: occasionally, however, it may and does prove considerable. The *treatment* must accord with the general rules established for the cure of other ligamentary extensions or strains, by first allaying the inflammatory symptoms, and then by counter-irritants, as blisters, &c., promoting an absorption of the deposit, and a healthy re-establishment of the parts. Firing, though sometimes practised, can be very seldom either necessary or judicious; unless, indeed, in very old cases, when it may be suspected that exostosis of the calcis has taken place, or that the ligaments are weakened to an extraordinary degree, in which instances, and in which only, is it admissible.

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* The practitioner must be careful not to confound this with fracture either of the coronary, navicular, or coffin bones; nor with a more acute attack of navicular disease in a horse previously affected with slight symptoms of groggy lameness; or with chronic founder. In the first case, the symptoms will be much more acute, and crepitation may also be felt: in the other cases, on the contrary, the inflammatory symptoms will be less; and however lame the horse may be, heat and external tenderness will be trifling.

CONTUSIONS OR BRUISES.

THESE are tumours formed by some external injury, wherein external laceration is not present, but a rupture of the smaller vessels occasions an extravasation of blood within (see *Extravasation*). If the injury be moderate, the parts will reinstate themselves; the effused blood will either become absorbed and the tumour be removed, or otherwise it will become organized, and, with some increase of dimension, will form an integral portion of the surrounding mass: but when the injury is violent, the parts may be unequal to either of these processes, when the extravasated blood will become a source of irritation, and suppuration will follow. Should a still higher degree of injury have been sustained, the entire tone of the substances around becomes destroyed, and sphacelus must take place; when the living parts will make an effort to remove the dead, and ulceration and an extensive sore will be formed.

The *treatment* of bruises will therefore vary according to these several circumstances. We should always endeavour to fully reinstate the part, by promoting absorption of the effusion; which may be done by giving local strength by external stimulating applications, as saline matter with vinegar, verjuice, spirits of wine, and camphor, &c. If the blood remain fluid, promote its escape by making a small depending orifice: if it suppurate, treat as a common abscess. When sphacelus occurs, treat as under mortification. Should the tumour remain indurated, stimulate the absorbents by mercurials, by friction, or by blisters; and, if very obstinate, by fire.

RHEUMATISM

IN the horse is doubted by some, who nevertheless cannot account for some anomalous symptoms on any other pathological view. It is acknowledged in cattle; and no one conversant with dogs but is aware that lumbago is one of the most prevalent diseases in their nosology. Many French writers of eminence treat of it. Professor Volpi has particularly and largely so done; and we are informed, that in the infirmary of the Royal Veterinary School of Lyons, during the year 1816, a muscular rheumatism, which affected the fore extremities, was very common, and was attributed to atmospheric moisture prevalent at that season. There was often considerable engorgement of the affected limb or limbs, and in one case, in which the hinder extremity was affected, a vast serous extravasation followed, and destroyed the horse. Rodet, who has also written on it, observes 'that rheumatic affections are not so rare as the silence of authors regarding them would lead us to imagine.' The military practice, he informs us, particularly offers many instances of the affection, of which he has given several examples (vide *Récueil de Médecine Véterinaire*, No. 23). Hurtrel d'Arboval has also entered into a full detail of the disease, and he not only notices numerous authors of notoriety, who have treated of it, but cites numerous cases. These, united with my own experience, enable me with confidence to enter this as a standard æquine disease. The horse, then, in common with other of our domestic animals, is the subject of a disease essentially rheumatic[*]; that is, of

[*] Suivant, Volpi le rheumatisme est une inflammation des muscles, commune surtout dans ceux qui font mouvoir les membres, et qui effecte essentiellement le cheval et le bœuf. Les refroidissemens

an attack on the membranous and tendinous aponeuroses of the muscles, more particularly so of the fore extremities. It appears also to be occasioned by cold and moisture, and is seen both in an acute and chronic form. Of the former, Gibson has treated under the designation of *external pleurisy*, the stiffening effects of which were known to farriers as *chest founder**. Bracken notices the latter, and has left some formulæ for the treatment of it.

Of *acute rheumatism* I have myself seen three or four well-marked cases, all which were traceable to cold or moisture as the exciting cause. The leading characters were alike in all, the attack being ushered in by universal stiffness, but more particularly of the fore quarters and extremities, with shivering, succeeded by heat, which was observed to give way, in some, to diaphoresis or sweating. One case was attended with considerable tumefaction in front of the breast, which I presume formed the *anticor* of the old school; and such deposits in the chest and limbs also appear not unfrequent on the continent, but are, I think, more rare with us, or have been less observed; but that they do occur is seen by the above instance, and I have seen the limbs also tumefied by a local deposit of a similar kind, and under a like attack. The *treatment* I pursued, and which I should again practise, was early and full bleeding; but I should now be careful how I repeated it, unless the inflammatory symptoms were urgent and the general vascular action great. The bowels were evacuated, antimonials were given, with digitalis, I believe: at all events, so I should recommend; and the more rigid parts were embrocated, as far as my recollection serves, with a camphorated ammoniacal mixture; to which was added, chest rowelling; but these I should, in future cases avoid, if there appeared any tendency to large serous deposits, which themselves might become critical, or if interfered with might, perhaps, take on an unfavourable action.

Chronic rheumatism is the sequel often of the acute; in other cases it appears the immediate consequence of exposure to a cutting wind, humid atmosphere, &c.; and is betokened by stiffness and tenderness of the parts it attacks: when of the extremities, it is not unusual to observe some tumefaction also, but always considerable lameness, and great disinclination to move. It occasionally attacks the loins, indeed not unfrequently: but I believe it is most common in the fore quarters. Sometimes one fore extremity and sometimes both are affected: when singly, sudden metastasis will often remove it to the other, which cases were not ill characterised by the old term *flying lamenesses*†.

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subits, un exercice forcé apres un long repos l'humidite du sol sur le quel les animaux se couchent, quelquefois les chutes, en sont les causes. Dès le début de l'affection, dit Volpi, il y a fievre, souvent legére, douleurs vives dans l'epaule ou le bras, dans les reins ou la cuisse; car le rheumatisme n'affecte ordinairement qu'un seul membre: l'animal boite; la chaleur de la partie malade est augmentee, et l'on y remarque une legére tumefaction. L'epaule est-elle le siege de la malade, les autres parties du membre ne presentent alors aucune lesion capable de faire boiter; si l'on fait mouvoir l'avant-bras en differens sens, l'animal donne des signes de douleur; enfin, la claudication diminue et même souvent disparait par l'effet d'une exercice prolonge. Il en est de même à l'égard des membres posterieurs.'

* *Founder*, from the foundering headlong, or tumbling gait it produces, has been applied to diseases totally opposite, as rheumatism in the shoulders, and phlegmonous inflammation of the laminæ of the coffin. It is true that a distinction was intended by the terms *chest founder* and *body founder* for the one, and *foot founder* for the other; but the terms are often found jumbled together in our old books of farriery. *External pleurisy* also as a name for acute rheumatism was derived from its being supposed to be seated in the intercostal muscles; and as it was attended occasionally (particularly during some seasons when it assumed almost an epidemic frequency) with cough, it gave occasion to suppose the thorax itself might become secondarily affected. There is no reason whatever to doubt the correctness of the accounts left us: it is, therefore, evident its appearances vary under different circumstances; for neither of the cases I saw exhibited any pneumonic symptoms, nor are such noticed as common in the continental cases.

† *Flying lamenesses*, as a term, well characterise the wandering nature of rheumatism, and I think were never better exemplified than in a black horse which I rode and drove nearly three years. This horse I bought with the character of being occasionally lame: he would sometimes work a week or two perfectly sound, and then become lame for two or three days. His feet were excellent, he had no corns, and was wholly without blemish: neither could it arise from ligamentary strain, for it was neither better nor worse for work, nor was he lamer when he set off than when he had gone some distance. It appeared to be confined principally to the off shoulder; and it was particularly remarked, that when he returned hot from exercise, and was not immediately attended to, his lameness was sure to come on. Every other practitioner must also have met with instances of faltering gait, returning at uncertain periods, of which the cause was not apparent. The older farriers always attribute these to humours, and, therefore, give physic: and though the cause thus considered is erroneous probably, yet the treatment is, nevertheless, judicious; for I have never found any mode that was so cer-

The *treatment* of chronic rheumatism must be conducted on the principles of removing the peculiar congestion of the membranous and tendinous parts by warm stimulating embrocations, by mild doses of physic, and by antimonials and digitalis, if the case is attended with constitutional excitation. If it remains principally confined to one limb, put a rowel in the immediate neighbourhood. Friction to the part is also very proper by brush-rubbing several times a-day; moderate clothing is also beneficial. In very inveterate cases, which are not uncommon among coarse fleshy horses, purgatives are found singularly beneficial: salt marshes are also good; but I think other turning out is not attended with great benefit. We have been informed that this complaint has been removed by a judicious use of strychnia.

RHEUMATISM IN CATTLE.

THIS disease is even more common among cattle than among horses; and is often observed on by graziers and breeders, who some of them call it a *chill*. The learned veterinary professor of the Lyons school was directed by the French government to attend to an annual attack of rheumatism which took place among the cows of the mountains of Jura; on which it is observed, 'Ce vaches ne prennent point la maladie à l'étable, elles n'y sont exposées que pendant l'important travail de la sécrétion du lait; le changement, non pas de pâturages seulement, mais de localités et d'exposition, suffit pour les rétablir.' The 2d volume of *The Veterinarian* furnishes us with a translation from an extremely well written paper on the same subject, by *M. Crurel, V.S., of Grenade (Haute Garonne)*, who describes it as being either a simple disease, or as sometimes connected with inflammation of some internal organ: if it affects the extremities, there is heat, tenderness, and enlargement; when the loins is the seat, the whole vertebral column is stiffened. Encysted tumours are apt to appear in the triangular space between the tendon of the gastrocnemius and the tarsus: this is particularly the case when the general inflammation passes into a chronic form. The causes are attributed to the variable state of the atmosphere, and to the low and ill-ventilated stables in which these stall-fed cattle are immured*. The treatment, we are told, was one copious bleeding, restricted diet, and emollient applications. The cysts which formed in the hock yielded only to the actual cautery, applied by means of a budding iron.

SUB-CLASS.

INDURATED TUMOURS.

Polypus enters the nosology of the French writers. Gohier mentions three cases, one only of which belonged to the horse; the others were attached to dogs. One case, however, well authenticated, determines its occasional existence. The *treatment* would of course be simple, either by ligature or excision. If the *pedicle* were profoundly buried in a cavity, the extirpation must be effected by forceps, or more properly by a canula. Levritt's double one is considered the best.

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tainly efficacious as this, though I have tried others: nor is this the only instance in which the older methods of cure, founded on long experience, prove the best, as in other instances they prove very bad.

* To us who, with few exceptions, keep our kine without doors all the year, it is a matter of some surprise when we see the extensive list of cattle diseases which enter the writings of the continental authors. But when we again reflect that the artificial life they are there subjected to, being housed for three-fourths of the year, must render them liable to the attack of numerous ailments a more natural state would free them from, our wonder ceases. There is altogether an enterprise of character and a determination in the veterinary practitioners, numerously and widely diffused throughout the provinces, which is as yet (but will not remain so) unknown among us. It is also there the fashion for agriculturists to employ accredited veterinarians, and these almost exclusively, on the diseases of all their domestic animals. They do not call in the veterinarian for their hunter only, and the farrier for the rest of their horses; they do not consult the cowleech for their cattle, the gelder for their swine, and the shepherd for sheep; while the neighbouring huntsman or blacksmith prescribes for their dogs. No: the veterinarian is applied to for all; and though his individual charges are small, 'mony mickles make a muckle.'

Sitfast is a term not unmeaning, but barbarous; and were we allowed to pun on it, we might say it deserved as well to be so called, because some heavy fellow had *sat* too long and too hard on it, as that it *sits fast* to the horse. I have already observed on the brutality formerly practised of tearing these tumours out with pincers. Make a clean incision in the skin, and dissect them out: if the skin be included in the induration, and is itself a portion of the tumour, remove it also.

Warts are indurated tumours, not uncommon to old horses, particularly to light-coloured and German bred horses. (See *Diseases of the Skin.*)

Indurations of the elbow are sometimes observed of cartilaginous hardness, called by old French farriers *couche en vache*, from the horse lying with his legs doubled under him after the manner of a cow, so that his elbows rest on the heels of the shoes, particularly when worn long or with calkens. It would be useless to attempt a cure without removing the cause in some way: that removed, by taking down the calkens and shortening the heels, the enlargement might be blistered; or otherwise it might be dissected out.

CLASS XV.

OF ENCYSTED TUMOURS.

ANEURISM.

True aneurism being a dilatation of a circumscribed portion of an artery, forming a *sac*, enclosing within it a quantity of coagula, becomes an encysted tumour. The existence of this affection in the horse and other domestic animals escaped the notice of all our early veterinarians; and, if I mistake not, it was not even mentioned by any of them, until Mr. Feron noticed it, but in a very indefinite manner. Mr. Percivall, in his Lectures, notices its occasional existence, and mentions a specimen of aneurismal tumour of the thoracic aorta in the Woolwich Museum. The first well marked case I met with was in 1819[*]. It has, however, been much longer known on the Continent. M. Huzard, jun. shewed me, if my memory be correct, one or more specimens in the Museum at Alfort; and he mentioned others in veterinary cabinets. M. Moreau met with an aneurism of the palato-labial artery, which destroyed the animal. M. Chouard, in the *Journal Pratique* for September 1826, gives two cases of aneurism; one of which was found within the aorta of a mare, near the renal artery; the other was also found in a mare, near the origin of the crural artery. In both these cases much surrounding disorganization had taken place. M. Vatel and M. Pigot both detail a distinct case of this lesion.

False aneurism, or that wherein blood has escaped from a wounded artery into the cellular substance, where it remains encysted, but still in communication with the opening in the arterial tube, has, I believe, not been distinctly noticed in the horse.

VARIX, OR BLOOD SPAVIN.

A DISEASED enlargement of the coats of the veins is termed *varix*, but which is not a common affection of the horse, as his superficial order is comparatively small, and not subjected to such artificial pressure as our own. The only instance usual in veterinary surgery is that termed *blood spavin;* which presents certainly something like a varicosed enlargement of the superficial vein passing over the inside of the hock; which, however, appears by no means a spontaneous disease in the vessel, but is the consequence of the pressure of a distended bursal capsule underneath, which, itself becoming sufficiently prominent to attract notice, is called *bog spavin.* This dilatation being situated immediately under the course of the vein, occasions some obstruction to the passage of the blood, and a consequent extension of its coats. Usually, therefore, the dilated capsule is the part to be attended to; but when the vein itself becomes so much enlarged as, by its own pressure, to occasion mischief, it can only be remedied by counter-pressure, or by removal. A bandage must be so contrived as to surround and take in the hock generally; but should press on the vein moderately only, or we should increase instead of diminish its distention by interrupting the passage of blood through it. The bandage may be kept wet with any astringent wash, as an assistant application; but should it still remain so much enlarged that its existence proves really hurtful, which, however, is very seldom the case, then its removal may be effected by carefully including the *vein*, and the vein alone, above and below the varix with two ligatures. Having done this, the tumour may be opened and the contents evacuated, suffering the remainder to slough away. But it should be remarked that, in five hundred cases of what is called *blood spavin*, it would not, perhaps, in one of them be actually necessary to take up or *bar* the vein, as a farrier would call it. It is infinitely more prudent, in almost every instance, to attempt the reduction of the dilated bursa, or mucous capsule of the hock, which occasions it, as directed under *bog spavin.*

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[*] In 1819, as I was passing over Hounslow Heath, my attention was directed to a country collar-maker, who was preparing to draw away a horse which had dropped down dead suddenly. As I learned that the horse was proceeding slowly when it happened, and was before in apparent health, I felt anxious to examine into the cause of his death. I therefore bribed the man to open him on the spot, when we found the chest filled with blood. After some difficulty from the immense effusion, I traced a rupture of the anterior aorta, immediately as it is given off from the posterior trunk. The collar-maker becoming impatient, and passengers gathering round, but more particularly as I had no convenient means of carrying it, being on horseback, I neglected saving the aneurismal sac, which I have ever since regretted.

DISEASED ENLARGEMENT OF THE BURSÆ MUCOSÆ, OR WINDGALLS.

THE tendons of those muscles connected with or passing over joints are furnished with membranous bags, called *bursæ mucosæ*, from being filled with a mucus to assist the motions of the part. These *capsules* are distributed about all the joints; but, in a *practical* point of view, some are more important than others. The immediate anatomy of these sacs may be learned by referring to *Bursalogy;* and for an account of them individually, see *Description of Extremities.* The morbid enlargement of these constitutes the *windgalls* of farriers: but which, by the by, never contain a particle of air. Violent and long-continued exertions determine more blood to the extremities, and, from its greater supply, the synovial secretion is augmented; thus it is that *windgalls* are almost the invariable attendant on hard work. While the swellings remain small, they can do little mischief, and had much better be let alone: but when they become enormously enlarged, they may produce injurious effects from the unequal pressure they occasion; which, by stimulating the parts around to throw out coagulable lymph, interrupts their motion; and, also, by a sympathetic effect on themselves, their contents become not only increased, but diseased, proving frequently inspissated and thick, by which the obstruction to motion is still further promoted.

In the *treatment of windgalls* we must attend to three particulars; the removal of any diseased alteration they may have occasioned in the neighbouring parts; the removal of their own distention; and the prevention of its recurrence. Stimulating applications are the most likely to produce a removal of any coagulating deposit; these are likewise still more proper, as they will tend to effect a removal of the contents of the windgall itself. The *liquid blister* of the *Mat. Med.*, applied as there recommended, will be very proper for this purpose. But simply to promote absorption of the contents of the windgall, continued pressure will be found the most convenient and efficacious method. A calico or a flannel roller may be prepared, of two, three, or four yards long, according to the part affected, and size of the horse: four inches is a proper width, and, from its superior elasticity, flannel is preferable to calico or linen.

In addition to this, be furnished with one or two pads, stuffed with horse hair or other elastic matter. Begin to apply the roller, and after having made a turn or two below the swelling, place the pad exactly upon the windgall; if in the pasterns, one should of course be placed over each side: continue the roller firmly and evenly over all, and fasten off. It will farther assist if either the pad or roller, or both, are first wetted with any astringent application: nor must it be forgotten, that but little benefit can be expected unless this be continued as a constant application for a considerable time, during the day, when not in exercise. A run at grass will commonly remove windgalls, if not callous; but on a repetition of the original cause (*hard work*), they are apt to return again, whatever the means pursued: the dilated capsule seldom regaining, with its original size, its original strength. When windgalls are very large, and of long continuance, if the blemish be not objected to, firing is perhaps the most effectual means of relief, and the more, as it tends to remove both cause and effect; for its stimulating properties excite the absorbents more actively than any other means; and by its lessening the elasticity of the skin, it becomes a continued support and source of pressure to the distended parts. I cannot dismiss the subject without warning the junior practitioner never to be incautiously led to puncture a windgall, or to evacuate its contents by caustic, or to dissect it out as recommended by even the best of our old writers, as Osmer, Bracken, &c. &c. Most of those of great bulk and long continuance actually communicate with the cavity of the joints they surround, by rupture or extravasation; and the others are of themselves sufficiently vascular to excite similar effects with open joints, when they are laid open; and even if no mischief followed, no good could result; the cyst would be only momentarily emptied; for its capacity would commonly remain the same, and the exhalent arteries would almost immediately fill it up again. Such an operation is, therefore, not only useless, but usually produces such inflammation as either destroys the horse, or ends in anchylosis of the joint. Bursal enlargements bear different popular names, according to their situations, and are particularized immediately following; but in all, the treatment must be *radically* the same.

BOG SPAVIN.

It is evident that *bog spavin* and *blood spavin* are one and the same; or if any real difference exists, it is, that blood spavin is the effect and the dilated capsule the cause; for it is but seldom that the pressure of the vein itself becomes injurious. The *general treatment* of this bursal enlargement is referrible to windgalls: an *individual* remark only is here necessary; that any bandage framed for the hock should allow the point of it to be uncovered; for it is not possible to apply one with sufficient elasticity as to allow the necessary motion without destroying the effect of a bandage.

THOROUGH-PIN.

Is the farriers' term for the bursal enlargement situated in the upper and back part of the hock, between the tendons of the great flexor of the foot and those of the gemini; and, as it necessarily shews itself on each side, so it is a *thorough-pin*. From the peculiarity of its situation it seldom occasions lameness, unless very large. It must be *treated* as a windgall.

CAPULET, OR CAPPED HOCK.

This arises from a swelling of the mucous capsule that surrounds the insertion of the tendon of the gemini muscles into the point of the calcis or hock. From its situation interfering with none of the moving parts, it is seldom detrimental: it is, however, very unsightly, and sometimes becomes of a great size, particularly when it is occasioned by the practice of kicking; in which cases not only is there an immense increase of the mucous secretion, but the integuments also thicken much. It has been punctured occasionally with some success, and the contents have been drawn off by setons; but the inflammation raised has endangered life; of which Mr. Feron details a case. It is more prudent to trust to the effects of blistering repeatedly; but if a determination is formed to evacuate the contents, do it by the minutest possible opening, made in a very inclined direction, so that the inner and outer opening shall not correspond directly, by which the contents can be partially evacuated, and when the inflammation excited has passed away, make another puncture. By these means it may be possible to avoid the consequences hinted at.

THE ELBOW

Is also subject to a diseased bursal enlargement, which I have seen of considerable magnitude; occasioned, in some instances, by blows, and in others by the practice of horses sleeping with their fore legs doubled under them, when the high calkens of their shoes injuriously press these parts. Mr. Feron has met with dropsical swellings containing two quarts, brought on by these means. In one case, such a swelling was tapped four several times, and in all, eight quarts of fluid were evacuated. This was not, however, it is probable, a bursal, but a cellular accumulation, or serious consequences would have resulted from opening so extensive a cavity. (See *Indurations*, Class XIV.) The bursal enlargement of the elbow may be *treated* by pressure, or by repeated blisterings; but the cause must also be removed, by shortening the shoes, or at least removing the calkens.

THE KNEE

Also occasionally presents small bursal dilatations, but which are never found to produce inconvenience.

CLASS XVI.

FRACTURES AND DISLOCATIONS.

WHEN any important bone is fractured in the horse, from the trouble of managing him, the expenses attending on his keep, and the risk of his future usefulness, attempts are seldom made to reunite it, but the animal is usually destroyed. In France, on the contrary, they attempt the reduction of almost every variety of fracture*. I have myself always been of opinion, that we destroy many horses with fractured bones that might be saved; and, I believe, it was formerly much more the custom than at present to attempt their cure. An older writer, of the name of Blount, has given a very good figure, with directions for the treatment of fractures of the extremities. If this were practicable then, under the present improved state of the art, there are probably but few broken bones but what might be again perfectly consolidated by judicious attention; and, particularly, if it happened to a beast of tractable and patient disposition. Even in fractures of the large and important bones, if the horse was either carefully slung, or partly slung and partly supported by close and compact littering up by bales of hay or straw at his sides, so that the idea of restraint was not excited in his mind, a cure would often follow. *See this subject pursued under the head of Restraints.* When a bone is broken, and there is no external wound, it is called *a simple fracture*, to distinguish it from that producing a wound externally, which is termed *a compound fracture*. In simple fracture, coagulable lymph is thrown out from the ends of the broken portions, in which vessels first form, and then deposit ossific matter, which consolidates and forms the *callus* or cement between them. But, in compound fracture the coagula escapes, and the union must be the work of suppuration and granulation; the vessels shooting through which deposit the ossific matter: thus the same end is brought about, though by a much slower process. Fractures are sometimes accompanied with dislocation also; in which case it is evident a reduction of the dislocation must be first effected, before that of the displaced bones. In the *treatment* of fractures, it is necessary that our ends be directed to assist nature, first, by replacing the divided ends as nearly as possible in their original situation; and, next, that by proper applications we retain them there, until union be effected. It is to be remarked also, that when bones are broken into numerous fragments, it is often necessary to remove the smaller and useless portions, otherwise irritation of their sharp ends will occasion an unhealthy inflammation: such fracture is discovered by the motion of the pieces underneath, and by the extreme tumefaction and tenderness present: they must therefore be cut down on and removed before union will commence*. I shall now proceed to notice the several fractures individually; premising, however, that it would not be prudent in the medical attendant to give too early a favourable prognosis. The impatience of the animal, and his great powers of resistance, all act against a successful issue from our attempts to bring about a cure. But if it is determined to attempt the union of the bony portions, commence by replacing the fractured parts of bone as nearly as possible in their original position, and next apply such aids as will so retain them until the union is consolidated. Carefully, however, watch your patient, that his own irritability do not frustrate your attempts. If the horse were very valuable, a steady attendant should remain with him night and day, alternating, however, his watch with some other equally trustworthy attendant. If the fracture is in the bones of the extremities, then suspension of the animal may be resorted to, which will, in a great measure, prevent the necessity of a constant watch.

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* This is exemplified in the following work, which was sent to me by its author, as a complimentary testimony, soon after its publication. 'Traité des Fractures dans les Animaux Domestiques; où l'on Rapporte des Exemples de Fractures Guéries aux Os des diverses Parties du Corps des Animaux, dont un très grand Nombre dans le Cheval, et des Observations sur cette Matière, tirées de la Pratique de plus de soixante Hommes de l'Art.' Par M. Fromage de Feugré. Buc'hoz has also published, Memoires Vétérinaire sur la Manière de réduire les Fractures de Jambe des Chevaux, &c. It also forms many pages in Hurtrel d'Arboval's valuable Dictionary.

In the theory of bandages so amply detailed by Bourgelat, in his *Essai sur les apparareils et les bandages propres aux quadrupèdes*, there are also some complex iron apparatus applicable to the various fractures, and bandages for every possible ease; but most of them will be found too complex, and seldom sufficiently convenient for the purpose.

Fractured Skull.—This injury, though not frequent, may happen from a violent kick or blow on the head. It is most likely to occur to the frontal bones, when the division made by the frontal sinuses will usually secure the brain from pressure; it may, however, suffer from concussion, and such a case should not be mistaken for the other. The frontal portions may be readily elevated, but the symptoms which have resulted will not be thereby relieved*. If external depression appears in any cranial fracture whatever, or if there be any doubt relative to it, the scalp should be removed by two cross incisions, when the depressed parts will come into view: those that are loose and detached must be removed, and other portions that are only indented may be raised by any instrument having a firm and safe hold. If this cannot be done without, apply the trepan. When this is effected, the scalp may be drawn together by a stitch or two, but the wound should be by no means exactly closed. No irritating dressings should be applied, but the part simply kept from the external air; and if much blood was not lost when the accident happened, a considerable bleeding should take place from the jugular, to prevent staggers coming on; and other depleting means must follow.

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* The English experience of the *treatment of fractures* is so limited, that I shall stand excused for borrowing most of what is necessary from other sources. Hurtrel d'Arboval enters into a very useful and considerable detail on this subject, and to him I would refer for much more than I have introduced. As general instructions on the matter, the following is applicable here. 'Les fractures dont la réduction offre le plus de chances de succès sont celles dès os longs, essais, superficieles, comme ceux de la portion étendue et détachee des membres locomoteurs, surtout quand ces fractures sont transversales, qu'elles existent vers le milieu de la longueur de l'os, et non près de l'une de ses extrémités. Une fracture de cette espèce donnant l'espérance d'un succès fondé, on pratique d'abord une réduction provisoire sur le lieu même où l'animal se trouve et où il a été pris de l'accident, puis on le transporte dans un local convenable. Pour cela, on le relève avec précaution, en s'aidant d'un nombre suffisant de personnes; on sollicité à marcher doucement de lui-même, et on le soutient dans ses mouvemens pénibles et difficiles de locomotion. Il est à propos de le tenir bien assujetti, au moins dans le moment ou l'on travaille à la reduction et à fixer l'appareil, et s'il est nécessaire qu'il conserve pendant plusieurs jours une position déterminée, il est bon de la lui donner d'abord. Quoique la cicatrice de l'os soit assez longtemps avant de s'endureir, il imparte néanmoins de ne différer que le moins possible la réduction, lorsqu'elle est reconnue practicable et à propos, ainsi que l'application de l'appareil, et de donner ces secours avant le développement de l'engorgement des parties molles, qui nuit toujours à la manœuvre. Si l'on n'était pas appelé tout juste au premier moment de l'accident, et qu'il se fût développé une tuméfaction et une inflammation plus au moins intenses aux parties environnantes de la fracture, faudrait-il attendre, pour precéder à la reduction, que ces phénomènes morbides fussent dissipés? Nous ne le pensons pas, à moins que les obstacles apportés par le gonflement inflammatoire ne fussent tels qu'ils rendissent la partie volumineuse au point de rendre toute œuvre sur l'os fracture impossible à entreprendre; on est alors commande par une invincible necessité. Mais on doit agir autrement lorsque la circonstance est différente; nous le croyons du moins!'

Fracture of the Zygomatic Arch.—This bony process is liable to fracture from kicks, blows, &c., in which case the broken portions may interfere with the motion of the jaw. In a case, therefore, of this kind it would be prudent, if the loosened portions could not be replaced through the skin, to make an opening and remove them; for should coagulable lymph become thrown out extensively, the motion of the coronoid or condoloid processes might be interfered with, to the interruption of mastication.

Fracture of the Jaw-bones.—These cases are not unfrequently happening from kicks or other injuries, and the unfortunate animal is almost always destroyed, under an apprehension that nothing can be done for him, or that he must be inevitably starved; but which is not always necessary; on the contrary, one is surprised how much nature and the docility of the animal unite in forming a junction of the bones. In jaw fractures, there is frequently a splintering of the bone into fragments, when, the sharp ends irritating the surrounding parts, a vast tumefaction takes place. In such cases we must not hesitate to open the swelling, and remove any such detached portions. It is true, this reduces the case to that of a *compound fracture;* but it is, nevertheless, in some instances, absolutely necessary, before the remaining parts can be replaced, or a healthy action follow. The treatment of fracture of the superior or anterior maxilla will involve itself with that of the nasal bones. When it is the posterior or lower jaw that is fractured, it is fortunate if one branch only be broken; should, however, the injury happen to both, there is still no need to despair. In such case, particularly if the bones be much shattered, both jaws may be actually bandaged together for some time, feeding the horse only by the nose, which is not altogether impracticable, but is, however, to be much better done by means of the stomach pump, for the use of which the bandages may be loosened and re-applied two or three times a-day; and such method of feeding may also be greatly assisted by nutritious clysters: but when one branch only is fractured, the jaw can be let loose, and the animal himself suffered to drink and eat, or rather mumble up a mash. In a fracture of the lower jaw, I once succeeded very tolerably by making a strong leather frame that exactly encased the whole jaw, which I made to adhere by means of pitch†.

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* For the treatment of cranial fractures, which may be supposed either by the symptoms or by examination to have depressed sóme portion of the cerebral bony case, I would refer to the author already quoted: my limits will not allow of the detail, if my own experience on the subject were sufficient for the task. These cases, with us, are usually treated on the spot in a very summary manner by the London knacker, the country collar maker, or the huntsman. Several successful cases of cranial treatment of fracture are scattered through the French veterinary writers. 'Bien que le traitement des fractures des os du crâne soit loin d'avoir souvent une issue heureuse, on peut cependant citer quelques exemples de réussite. Une jument attelée au cabriolet s'étant brisé l'os frontal en se heurtant violemment contre la poignée de l'espagnolette d'une porte-cochère entr' ouverte, Gougis la pansa très méthodiquement, et observa qu'au bout de quatre mois la réunion de l'os était complete et parfaitement consolidée. Guinet dit avoir traité et guéri un cheval d'un pareil accident, par suite d'un coup de pied; mais la réunion de l'os n'eut lieu qu' après la cicatrice, et il resta un trou de vingt-cinq millimètres (un pouce) de diamètre. Gougis à lui-même observé la même chose dans une jument hors d'âge; le trou resté au frontal était de la largeur du bout du doigt. Berbier fils a gueri une fracture du crâne, dans un jeune veau de dix mois, au moyen d'un appareil poisseux ou agglutinatif. Nous savons que Bouley jeune a plusieurs observations qui lui sont particulières, sur les fractures du crâne, mais nous ne les connassions par aucun detail.'

† 'Un simple bandage contentif suffit ordinairement pour la fracture simple et sans déplacement; dans le cas contraire, il faut d'abord procéder à la reduction de la fracture, et en suite s'occuper de maintenir en coaptation les fragmens osseux, au moyen d'un appareil convenable. La direction de

Fracture of the Nose.—From the brutality of drivers, this accident sometimes happens; it is likewise not unfrequently occasioned by kicks from other horses; and I have still more frequently seen the nasal bones extensively divided by sabre wounds in engagements. Whenever it happens, the bones should be immediately replaced as much in a natural situation as possible, and the external wound carefully closed from the action of the air. In case the fractured parts cannot be replaced by the nostrils, it would be prudent to elevate them by means of an opening made with the trepan: but, in general, the replacement of these bones, when depressed inwardly, as is usually the case, may be effected by means of something introduced up the nostrils wrapped round with tow, linen, or woollen; and whenever either the nature of the applications or the extent of the accident interferes considerably with respiration, we should not hesitate to open the *trachea* (see *Tracheotomy*). After which there may be first tried a false nostril of pasteboard, covered with wool or velvet, or one made of sole leather, &c., might be introduced: but it must be remembered, that any such support is too apt to occasion very considerable inflammation, and ulceration also of the pituitary membrane, from which glanders may result: it would therefore be better to replace the nasal bones, and to retain them by means of external bandages*.

Fractured Ribs.—Blacksmiths are apt, from the effect of passion, to strike a horse with their shoeing hammer. I have more than once seen a fractured rib from this cruelty. In other ways, also, the ribs may become fractured. If the fractured portion of the rib penetrate the cavity of the chest and wound the lungs, there will be considerable danger from hæmorrhage, and also that air will escape into the cellular membrane, and produce emphysema; to prevent which immediately apply a bandage, which will tend also to bring the rib externally into its place, while the action of the lungs will assist it internally. If, notwithstanding, air escape and enter the skin, which is known by the distention and crackling feel under the hand, evacuate it by small openings made with a lancet.—See *Emphysema*.

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la fracture est-elle perpendiculaire à la longueur de l'os, la surface mentonnière de cet os est-elle seulement abaissée, il suffit de rapprocher d'une de l'autre les arcades dentaires pour que la deformité disparaisse. Si la solution de continuite est oblique et accompagnée de l'enfoncement du menton en arrière, on fixe d'une main le fragment posterieur, en même temps que de l'autre on saisit le partie anterieure de l'os, et on la porte en avant, en la rapprochant de la mâchoire superieure. Les divisions qui correspondent à l'angle de la mâchoire, et les fractures de l'apophyse coronoïde, n'exigent d'autre attention que celle de maintenir l'os relevé et en repos. Enfin, dans les fractures situées au-dessous des condyles, ces éminences étant entraînées en avant, il est indispensable de porter le reste de la machoire dans le même sens, afin d'obtenir une exacte coaptation. Quantà l'appareil propre à assurer la situation que l'on a donnée aux parties blessées, il doit varier suivant la situation, la direction, l'espèce, la forme, etc., de la solution de continuite. Cet appareil doit être aussi simple que possible, et se compose, dans la plupart des cas, d'attelles placées sur les branches du maxillaire, et maintenues par des tours de bandes. Celui que Barthélemy a imaginé consiste en une têtière et une sous-gorge semblables à celles d'un bridon: quatre montans attachés inferieurement à un anneau viennent se fixer, l'anterieur à la têtière, le posterieur à la sousgorge; l'un des deux lateraux, en passant par-dessus la nuque, vient se fixer à une bonde que porte le montant latéral opposé, ce qui forme une seconde têtière; de distance en distance, le long de ces montans, se trouvent des muserolles dont le nombre varie suivant la situation de la fracture, et que l'on serre à volonté et au degré convenable, au moyen de boucles. Pour que l'appareil ne blesse pas, il est indispensable de faire usage de coussins, et comme les muserolles n'exercent pas une compression égale, on peut placer par-dessous des attelles qui transmettent régulièrement aux parties la compression déterminée par l'appareil. On alimente l'animal par des bouillies claires farineuses, que l'on injecte au moyen d'une seringue, ayant soin de diriger la canule vers la voûte palatine; car, sans cette précaution, la langue, bouchant l'ouverture, empêcherait le jet du liquide. Il arrive assez souvent que l'animal se défend dans le commencement; mais bientôt, pressé par le besoin, il s'y habitue et favorise même l'ascension du liquide. On emploie ordinairement la farine de froment, de seigle, d'orge; il est nécessaire qu'elle soit bien tamisée, s'il y a plaie dans l'intérieur de la bouche. Si l'on pouvait obtenir que l'animal tînt la tête levée, sans nuire aux disposition faites à l'egard de la fracture, on pourrait aussi lui injecter ou lui entonner des breuvages nutritifs par les narines. C'est ce qu'on pratique quelquefois sans que les animaux en souffrent, bien que ce mode d'introduction les fatigue et détermine l'ebrouement.'

* 'Si le déplacement a lieu en dehors, on repousse les pièces osseuses pour les réduire et en opérer la coaptation; on conseille ensuite de les maintenir et cet état, au moyen de liens circulaires qui environnent la tête. Mais ces liens, en empêchant les mouvemens et l'écartement des mâchoires, rendent l'alimentation impossible, et ils exposiraient l'animal à mourir de faim. Avec un peu d'idée on peut éviter ce grave inconvénient: il s'agit d'adapter aux montans d'une bride dépourvue de son mors, et à muserolle, deux attelles auxquelles s'attachent les liens, ce qui laisse toute sa liberté à la mâchoire inférieure. On peut aussi employer le ferrement imaginé pour Bourgelat, et compose de deux branches qui descendent le long de la crête zygomatique, et auxquelles s'attachent pareillement les liens.'

Fractured Vertebræ.—When horses, according to the phraseology of farriers and horse-dealers, are what is called *broken-backed*, *chinked in the chine*, or go *german*, derived from a *manege* gait, it is sometimes from a rheumatic affection of the ligaments of the spine, or a forcible extension of them: in others, anchylosis has occurred. But occasionally fracture is present from some violence offered. It sometimes happens to the bodies of one or more of the dorsal or lumbar vertebra, either in casting, or during the struggles a horse makes to disengage himself after he is down. (See *Casting*.) As no such accident can happen without the spinal marrow becoming pressed on, so paralysis of the hinder parts follows, and death ensues. It might, as a matter of experiment in these cases, be worth the attempt to cut down on the fracture, and endeavour to remove the loose portions of bone, by which the pressure might be relieved from the spinal cord. Fracture of the spinous processes of the vertebræ is a much more common accident, but much less serious, unless accompanied with laceration, when a wound very difficult to heal is produced. If the bone cannot be replaced, and an uneven surface is likely to follow, which might interfere with the saddle or harness, remove it if it be not a large portion.

Fractured Pelvis.—When this accident occurs, the owner should well weigh how much he values his horse, and the veterinarian called in should well weigh, after due examination, the chances for and against a perfect recovery. If the fracture be external, it shews itself very plainly; but when it is internal, the exact part that is fractured is not distinguishable. If any thing is done, let the fractured portions be attempted to be extracted; but should it be the spine of the ileum (the hip bone), and it be not entirely separated, by no means disturb it, for in all probability it will reunite.

FRACTURED BONES OF THE EXTREMITIES.

IN *fractures* of the larger bones of the limbs, the horse is almost always killed, as being supposed incurable, or that, if cured, he would be utterly useless: but not only are many of these cases also curable, as has been occasionally proved, but a horse frequently becomes very useful afterwards; and it is evident that the breed of such an animal, at all events, provided it be a mare or stallion, may be made subservient to our purposes.

Fractured Scapula, or *Shoulder-blade*, is rare, but does occasionally occur: even a kick from another horse has separated it from its cervix; and on the continent I saw a broken mass of a gun-carriage fracture this bone into five distinct pieces. In fractured scapula the toe trails along the ground; but as it does the same whether the arm or fore arm be broken, so we must look for other evidences; and these are gained by attempts at elevating the foot, which not only give excessive pain, but usually produce a *crepitus* sufficiently distinct, particularly if the hand is placed on the part. A *cure* may be effected by suspending or supporting the animal, united with the application of some adhesive matter, which can give solidity to the limb without excoriating it; further strengthened by bandages judiciously applied, so as to have an equal and extensive bearing. M. Fromage de Feugré, who, as before observed, has signalized himself by his collation of cases of fracture, directs that the whole of the fore parts may be encircled with bandages, to keep the injured bones as much as possible in their natural situation. After this the horse should be gently forced on the opposite side, and retained there until the cure be effected. M. Godine informs us, he made a cure for a stallion whose scapula was fractured by a carriage. He first enveloped the whole scapular surface with a thick pitchy mixture, over which was placed supporting bandages, crossed from above downwards, and from below upwards, making the point of the sternum and the withers fixed points of contact, by which the fractured part was steadied and applied to the chest. The horse was then turned loose in an enclosure, and within a month he was able to bear lightly on it, and in four months walked without lameness; but some defect was discoverable in his trot. *Hurt. d'Arboval, art. Fracture.*—In another case of the like kind, M. F. de Feugré informs us a cure was brought about by attaching the lame limb to the well one for forty days. I should suppose that something sufficiently soft and bulky was placed between the fore legs, and that all were then rolled round together: in three months, we are told, the horse walked without lameness. Bourgelat, in his work on bandages, gives directions for a very complex iron apparatus for enveloping the scapula.

The *Humerus* is not often fractured. It is very short and thick, and so strong as to be little in danger; but when it does happen, the plan recommended for the cure of the scapula would be here also proper.

The *Cubitus*, or *Arm* as it is called, is rather more frequently broken, and may be successfully treated as follows:—Having first slung the horse, reduce the fracture; that is, replace the ends of the divided bones in correct apposition to each other. The animal might be partially slung, so that the feet might just rest on the ground, without taking but little of the weight of the body: fasten each foot in its natural situation; that is, in the situation it would of itself fall. Do this by any ingenious means, as hobbles ringed to the pavement or floor; or four strong boots might be firmly attached to the floor, and each leg, being introduced to its appropriate boot, might be firmly laced in. When all is safe, encase the fractured limb accurately, by making a bandage embrace every part, and strengthen the whole with proper splints. If slinging in this case produced extraordinary efforts, it should not be persisted in, but well bedding up should be preferred. Whenever slinging can be dispensed with, it should; and without doubt there are many horses sufficiently tractable to assist in supporting their own weight by means of the uninjured leg; but this would be only likely in the case of a direct transverse fracture, and a just opposition of the ends of the bone together. In case of an oblique fracture, we must depend on slinging, or on retaining the horse on the ground with his fore extremities united into one mass by bandaging. M. H. d'Arboval advises, ‘ Quartres attelles peuvent suffire quand le déplacement n'est pas trop considérable, une pour chaque face: celle de la face externe, nécessairement plus longue que les autres, doit être prolongée supérieurement, afin d'empêcher les mouvemens de l'articulation huméro-cubitale, et toutes doivent partir inférieurement du milieu du métacarpien (canon). On place la filasse, disposée convenablement, en commençant au-dessous du genou, on applique ensuite les attelles sur les quatre faces, parallèlement à la longueur du membre, et on les fixe avec des bandes. Plusieurs, vetérinaires sont parvenus à guérir de semblables fractures.'

The *Femur* is likewise occasionally fractured; and though the French authors give us reason to hope for a salutary re-union, and likewise directions for the management; yet I never saw a favourable instance, and I doubt much, except for slow draft work, whether it might be worth the trouble, expense, and pain to the animal to attempt it. But when it has happened to a valuable stallion or brood mare, whose future usefulness in propagation would not be materially affected by it, we might then with propriety attempt a re-union either by strict reduction of the fracture, which would require an almost frightful force, or we might here more prudently leave the bones to make their own junction, applying sustaining bandages and solidifying applications, after the same manner as to the scapula and humerus, with *suspension*, which here could probably not be dispensed with.

Fracture of the Tibia is more common than that of the femur, to which it is mostly exposed at its inferior part, where the resistance of the muscles, and its obliquity, render efforts at reduction generally unavailable. Union, however, will take place between the bones, and the deformity will be lessened, as well as a more favourable position of the pieces for future action will be gained by bandaging and by splints; and also by support to the body from the ceiling, either wholly or partially: by these means the animal may be rendered useful for heavy draft-work or for breeding. Bourgelat invented some iron machinery for these cases, which embraced the bottom of the foot, passed up the cannon, made a contour at the bend of the hock, and directed itself along the front of the tibia, or, as popularly expressed, the thigh, which it cradled as it were. Tolivet and Imbert simplified this by a plain iron bar, which extended along the tibia and entered a hole made in the point of the shoe. Many notices of cures of fractured tibias (we suppose of such as were sufficiently perfect for the purposes of drawing) are quoted in French authors. To cattle, these means are particularly available.

The *Olecranon*, or *Elbow*, has been fractured by violent efforts of the muscles; but the tendinous attachments render it extremely difficult to apply means to retain it in its situation. It is only by preserving a state of absolute relaxation of the limb that any attempt can have a chance of succeeding*.

Fractured Cannon.—This bone, when fractured, provided the accident be such as to separate the broken portions from each other, is of difficult treatment; otherwise it is by no means so: the very muscular action which resists the reduction in the former case, serves here to keep the bones steadily applied; and I have seen such a case treated successfully without slinging, by a stiff frame of leather, resembling splints for human fractures, only more extensively applied. In Blount's Farriery there is a plate representing some ingenious machinery for the cure of these cases. Mr. Bass, V.S., near Barnet, is said to have had several of these cases, which have terminated successfully, by the application of proper splints and bandages, and which instances are now so common, that no practitioner would be warranted in condemning a horse with a simple fracture of one of these bones, unless the fracture were near to or within the capsular ligament; in which case anchylosis, I believe, always takes place in the horse. The French method of treating fractures of the cannon is thus detailed by M. H. d'Arboval: ‘La réduction n'est pas toujours facile dans les grands animaux, mais une fois qu'elle obtenue, les extrémités fracturées sont en opposition, la rétraction des parties tendineuses tend à les faires appuyer plus fortement l'une sur l'autre, le nouveau déplacement est ainsi prevenu, et en effet il n'a plus lieu. La réduction s'opère, comme dans toutes les fractures des membres, par la contre-extension, l'extension et la conformation; les deux premières de ces actions sont souvent de la plus grand difficulté à exécuter dans les grands animaux; il faut souvent que des forces plus qu'humaines y concourent; c'est pourquoi on est presque toujours obligé d'avoir recours à une espèce de moulinet. Pour s'en servir, on appuie et arrète le corps de l'animal contre un corps volumineux et solide, tel qu'un arbre ou une poutre invariablement fixée par les deux extrémités, dont les deux extrémités soient engagées dans une direction diagonale, sur le sol, aux deux angles d'un bâtiment carré, on à un seul angle et contre le seuil d'une paroi de muraille ou de placage; la région du membre au-dessus de la fracture se fixe à cette piéce par diverses attaches, dont une des plus essentielles est celle qui part du dessous du genou ou du jarret, afin qu'on ne tiraille par les articulations supérieures et qu'on ne s'exposé pas à les luxer; on attache ensuite le membre au-dessus du boulet avec un fort trait qu'on enroule par l'autre extrémité sur un treuil au moyen de leviers. En faisant agir ceux-ci petit à petit et avec ménagement, l'alongement s'opère sans secousses, et la facilité qu'on a de la maintenir au point ou il doit être laisse tout le temps de procéder à la coaptation et à l'application du premier appareil. Quand celui-ci est bien fixé, on lâche peu à peu le trait jusqu'à ce qu'il soit tout-à-fait détendu; alors on le détache du membre, et on relève avec beaucoup de précaution l'animal. On s'occupe en ce moment de l'appareil définitif, qui consiste dans une espèce de fourreau de filasse, les attelles et des bandes fortes. Les attelles doivent être au nombre de quatre, une pour chaque face, et avoir assez de longueur pour empêcher les mouvemens des articulations voisines; elles doivent par conséquent partir du dessous du pied, et se prolonger en remontant jusqu'au-dessus du jarret ou du genou. Girard, qui a employé avantageusement cet appareil, le dispose de manière que le point d'appui que peut prendre l'animal se fasse au-dessus de la partie fracturée: pour cet effet, il emploie des attelles de différentes longueurs, et laisse excéder inférieurement les plus longues, de manière qu'en se prolongeant au-delà du pied, l'animal s'appuie sur elles; ces attelles étant d'ailleurs fixées par leurs extrémités supérieures autour du membre, le point d'appui est partagé et se trouve réparti partout, et les mouvemens des jointures inferieures sont annulés par ces mêmes attelles, qui compriment assez fortement. Cette disposition est très ingénieuse; elle n'est malheureusement applicable qu'à des animaux très doux, très dociles qui restent volontiers dans la position qu'on leur fait prendre, sans se livrer à aucun mouvement. Il nous semble qu'on pourrait la perfectionner encore en fixant les attelles longues, par en bas à une espèce de fer de patin qui poserait sur le sol sans toucher à la sole, de laquelle il serait isolé de douze à quinze millimètre (cinq à six lignes) seulement; de cette façon l'appui se ferait à plat sur une surface correspondante à celle du dessous du pied, ce qui serait mieux que s'il avait lieu sur des extrémités d'attelles.'

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* ‘L'apophyse olécrane, qui ne tient que faiblement à l'extrémité supérieure du cubitus, peut aussi être fracturée, ce qu'on reconnait au défaut de saillée à l'endroit du coude et aux signes propres des fractures. Les muscles extenseurs de l'avant-bras remotent l'olécrane, l'animal boite très fort, et ne peut étendre le membre; si on le fait marchée, il ne s'appuie pas sur ce membre et traine le pied. Cette fracture est difficile à reduire, parceque les muscles extenseurs tiennent l'apophyse dont il s'agit relevée; elle est ordinairement incurable quand elle est complète; dans le cas contraire on a quelquefois obtenu des succès; Taillard, Larmande, Lépinard, Réant et Huzard l'ont éprouvé. Il s'agit d'abord de porter l'olécrane en dehors, en plaçant une pelote ou une espèce de coussin entre cet os et les parois du thorax, le déplacement ayant toujours lieu en dedans. On applique ensuite des attelles pour empêcher les mouvemens des articulations voisines, et on les fixe par des tours de bande, qui doivent maintenir le tout en embrassent le cubitus ainsi que la poitrine.’

Fractures of the large and lesser Pastern Bones are not unfrequently occurring. In case of the large pastern becoming so, the fetlock approximates the ground when in motion, and the broken bones crepitate on taking this part in the hand. A fracture of this bone is less likely to anchylose than one of the small pasterns; for as these fractures in both are apt to be oblique, and particularly so in the lesser pastern, so when it happens to that, it is more probable that the fracture will extend into the capsular ligament, in which case anchylosis is very likely to follow. Hurtrel d'Arboval observes, that these cases were not at all uncommon at Alfort, and were treated, after reduction, by enveloping the pastern in some adhesive matter, from the coronet to the middle of the cannon, over which pasteboard supports wetted with spirits of wine, were moulded and made fast by bandage. Over this four splints were then placed and bound, having the interstices filled up with wool, tow, or other matter, so as to make the whole into one solid, firm mass. It is justly observed, however, that this will not always prevent motion between the fractured portions; in which case our author further directs: 'On est souvent obligé d'ajouter par-dessus quatre autres attelles plus grandes et assez larges, en bois de chêne. Il faut auparavant avoir bien rempli ce qui peut rester de la dépression qui existe entre le boulet et le pied et jusqu'à leur niveau, et envelopper toute cette région de filasse agglutinée, jusqu'à former une enveloppe assez saillante pour que les longues attelles trouvent un point d'appui. Ces dernières attelles, au nombre de quatre, une pour chaque face, tant latérales qu'antérieure et postérieure, doivent aller jusqu'au genou ou au jarret, et êtres enduites de térébenthine; on les fixe par des tours de bande, et, afin de les maintenir à une distance convenable les unes des autres, on fait un tour de bande autour de chacune d'elles, à mesure qu'on les place successivement. On fait ensuite tout ce qu'on peut pour empêcher l'animal d'appuyer sur le pied de la jambe malade, sans toutefois se permettre de tenir le genou fléchi, s'il s'agit d'une extrémite antérieure, afin de ne pas s'exposer à un raccourcissement très grand dans les tendons fléchisseurs du pied; il en résulterait que l'animal resterait avec la jambe arquee. La claudication persiste quelquefois assez long-temps, ou même toujours, après la guérison.'

Fractures of the lesser Pastern, or *Coronary Bone*, are even more frequent, and usually more extensive, than those of the large pastern, which can only arise from the nature of its connexions, and the mode of implantation of the various tendinous and ligamentous expansions inserted into it. Violent exertions have been known to pull it into fragments; and perhaps nothing shews the extreme power of the motive organs of the horse under great excitations than these fractures. These accidents are seen in both feet sometimes. Fromage de Feugré mentions a case wherein both coronary bones of the hind feet were broken, each into three pieces, and another into four pieces. Henon even relates a case where the four coronary bones were fractured at once, one into four divisions; and in another instance, the force had been such as to comminute this solid mass into seven portions. This fracture is somewhat difficult to detect from those of the coffin and navicular bones: there is, however, usually a greater difficulty in moving, a greater prostration of the limb; the tenderness is considerable around the coronet, and motion made there detects the crepitation immediately under the fingers. The *treatment* will consist in supporting the parts: merely setting or reducing such a fracture is a fruitless attempt, and the pressure around it usually prevents much separation of the broken portions, as the very nature and extent of the fracture, which usually communicates with the articular cavities, prevents any other than an anchylosed union, and consequently an imperfect cure. The coronet and the fetlock may be filled up with pitch or paste; bandaged also, and afterwards further supported by padding the fetlock, in such manner as to take off some of the weight of the limb, by being connected with different points of bearing, which should be distributed over the limb, across the withers, and again down until it is brought again round to the limb of the other side. However, I would recommend bleeding by the toe, thinning the hoof all round, and immersing in water by means of wet cloths around until the actual inflammatory symptoms were abated. It should then have a supporting bandage derived from the fetlock, after the same manner as the last; and foot, fetlock, and all, should then be immersed in pitch, &c. &c.

Fractures of the Coffin.—The coffin bone is not frequently fractured; however, numerous well-marked cases are on record where, in most instances, the accident arose from some violent action of the muscles, which forcibly pulled it into several pieces. I have seen two or three museum preparations of fractured coffin bones; but I have seldom met with a case in the living subject. M Huzard directs the foot to be immersed in a mass of pitch and resin, which, he assures us, will effect a cure.

Fractured Navicular Bone.—This accident, though rare, is, however, more frequent than the fracture of the coffin. La Fosse has very circumstantially described it; Osmer also notices it; and, in later times, it has been met with. I do not here confound an accidental fracture of this bone from violence with those lesions which occur to it and its ligamentous attachments, which have been so much the object of inquiry of Mr. Turner, under the name of *navicular disease*. This accident is betokened by a considerable and obstinate lameness following an apparently trifling accident; and the treatment of it must be very similar with that of coffin fracture[*]. In some cases, however, of navicular lameness, it is not the bone which has become broken, but its ligamentous attachments, which proves equally incurable. Mr. Field has also two preparations of this fracture, as we are informed by Mr. Percivall.

A Fracture of the prominent portion of the *Ilium*, or *Haunch Bone*, sometimes occurs, and when it is of the simple kind, the adhesive inflammation which follows readily unites the parts; but from the action of the muscular fibres implanted into the disunited portion, it is drawn aside, and no surgical efforts can retain it in just opposition with its fellow portion. These cases are called *hipped*, or *let down on the hip.*

The *Patella* is likewise occasionally fractured by violent kicks, when the action of the tendons inserted into its surfaces disunites the fractured portions, beyond the power of veterinary surgery to bring together; and the limb is useless, having lost the antagonist to undue flexion and extension; it will be therefore of no avail to attempt a fruitless treatment.

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[*] Hurtrel d'Arboval is unusually concise and meagre on this fracture, and seems to have altogether forgotten La Fosse, with whom the first notice of its existence originated. After describing fracture of the coffin bone, he continues, 'Ce que nous venons de dire de la fracture du dernier phalangien, s'applique parfaitement à celle du pletit sésamoïde, os placé à la partie postérieure de la surface articulaire de l'os du sabot. Jolivet a vu cette dernière fracture arrivée par un *clou à bande* qui traversa la sole; les accidens qui s'ensuivirent firent détacher le sabot et obligérent de sacrifier l'animal; ce fut alors qu'on reconnut la nature de l'accident. Bastien assure avoir guéri un cheval à la suite de cette fracture; elle etait sans doute accompagnée de moins d'accidens.'

DISLOCATIONS OF BONES.

THE articular surfaces of bones are sometimes displaced from their proper situation, when they are said to be *dislocated* or *luxated*. In human surgery this forms a very important branch of practice, but is less so in the horse: not that these separations do not sometimes occur, but the immensity of the resistance is such, and our surgical machinery at present is so little calculated to make an equable counter-extension, that few reductions of dislocation have been attempted. The inquirer will meet with a full detail of the subject in Hurtrel d'Arboval. I must content myself with noticing that of the patella, as being not altogether uncommon, and easily reduced.

Dislocated Patella.—This dislocation was almost unknown in our art, or at least it was passed over as one of those cases which the resistance of the animal and the contractions of the muscles would prevent any probable reduction of. In my early days of practice I confess I should have thought so; nor might I have readily been convinced to the contrary, until I met with a case, which I myself saw occur in hunting, where a gate which was closing caught the stifle of a horse as he attempted to pass through, and immediately reduced him to a pitiable state of helplessness. As I was directly behind him and saw the blow, I readily entered into the nature of the case, and with a very moderate share of assistance, and comparatively with little force employed, the patella slipped audibly into its socket, and the animal was led away slightly limping only. The situation and attachments of this bone are such, that it is only some very extraordinary violence that can dislocate it inwards*; but it can be displaced outwards more readily; in some cases with more ease than the strong mechanism of the general articulations of the horse would lead one to expect. In colts, from the general suppleness of their limbs, and from the articular prominences and depressions having not yet acquired their full extent of adaptation, this dislocation happens frequently, and in some instances reduces itself by the motions of the animal. In *The Veterinarian*, vol. iii, a case is related where the low state of condition was connected with the frequent dislocations of both patellæ in a pony, from very trifling causes, at such times, and at such only. It appears much more common in India than with us, which is accounted for by the mode in which the horses are there confined by each leg to the flooring of the stable.

The Signs of a Dislocated Patella are the rigid determination of the limb backwards, exactly as might be expected from the loss of the moving pulley into which the extensor muscles of the thigh are implanted, from which, the flexor muscles having no antagonists, the limb downwards remains firmly flexed, the toe dragging on the ground. The displacement of the patella itself is less a guide than might be imagined; but the complete determination of the limb backwards, and the flexion of the pasterns and foot, will serve to distinguish it from a fracture of the femur, with which only it is possible to confound it; but which can at once be set at rest by grasping the condyles of the femur and rotating them, which will render any crepitus distinct. An examination of both limbs will however detect the loss of the protuberant patella in its natural situation, and will also detect it towards the outer edge of the thigh, but sometimes so deeply imbedded within the muscles of the part, particularly in coarse fleshy horses, as to almost escape cursory observation. This occurs from the powerful actions of the extensor tendons implanted within it; to which cause we must also attribute the pain which is sometimes observed in these cases.

The *reduction* of the dislocation is not usually a difficult operation, particularly in young horses, in such as are in low condition, or in recent cases: but when otherwise, and more especially when it has been done many days, it may be attended with some difficulty. The grand object when we attempt the reduction, is to relax the extensor muscles to the utmost, to which end the stifle should be raised and brought forward by assistants, or by a firm bandage applied around the fetlock and carried over the fore parts; by tightening of which, and drawing the pastern upwards and forwards, the extensors themselves will then assist in the reduction, provided the outer angle of the patella be depressed, which will raise the inner angle from its bedding within the soft parts, which forms much of its resistance. While the hands are employed in this depression, they should also force the patella forwards, when the reduction will be effected. The practitioner must bear in mind that this dislocation having once happened, the ligaments have been thereby put so much on the stretch, that it is liable to recur by a very slight cause; the part should therefore be sustained as much as possible by a bandage. Mr. C. Percivall in such a case very judiciously blistered the stifle, when the inflammation secured the parts, at first by tumefaction, and afterwards by its stimulating property on the relaxed fibre. Mr. W. Percivall recommends firing the part in case of recurrence, which would certainly have the effect of a permanent bandage.

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* The only case we have recorded among us of dislocation inwards comes from Mr. Cherry, in the *Farrier and Naturalist*, No. 8, where it is described as drawing the limb upwards, being attended with much pain, and requiring much exertion to reduce it.

CLASS XVII.

DISEASES OF THE BONES.

CARIES, OR MORTIFICATION.

BONES are subject to inflammation, which terminates, like that of the soft parts, in resolution, suppuration, or in mortification. The living powers of parts being generally proportioned to their vascularity, bones, as having less blood than some other parts, are weaker, and their actions, both healthy and unhealthy, are slow: consequently they do not readily fall into disease, but, having so done, the morbid action frequently produces death in them. A loss of the medium by which bones are covered and partially supported, will also produce mortification: thus, when the periosteum becomes torn off, or otherwise extensively destroyed, the bone under it usually dies: it is however necessary to observe that the restorative powers here, as in other quadrupeds, are more active than in man.

Exfoliation.—When death has taken place in a bone, the process of its removal is called *exfoliation*, and such process is effected by the absorbents; for the dead bone becomes a stimulus to the absorbing vessels belonging to the living bone with which it is in contact, stimulating them to remove so much of the living as forms the union with the dead; by which means the decayed portion, losing its attachment, comes away. In *caries*, therefore, it must be our endeavour to assist this exfoliation by any means that will further stimulate the absorbents of the living part. Sometimes, from an actual want of power, the caries spreads; in which case we must rouse the living bone into greater action by forcible stimulants; as, oil of turpentine, tincture of myrrh and aloes, brandy, or other spirits; but the most effectual mode is, by the application of the actual cautery, in the form of small heated points applied around the outer edge of the decayed part.

EXOSTOSIS.

THE osteological detail in Section VIII, shewed that bones were organized like the soft parts of the body, from whence it might be supposed that they are also susceptible of disease, the most prominent instance of which is *exostosis* or bony tumour, the consequence of a morbid increase of the secretion of bony matter either within the medullary membrane and cancelli, or otherwise deposited on the surface immediately under the periosteum, and thence denominated by Sir Astley Cooper, *periosteal* exostosis; as the former is called by him the *medullary* exostosis, which occasionally degenerates in the human subject into an osseous fungus of a malignant and fatal character: this, as far as our present information extends, the horse is fortunately not subject to. It is to the periosteal exostosis, or *cartilaginous exostosis* of the *periosteum*, as further distinctively named by the same eminent surgeon, that those bony swellings we call splints, spavins, &c., owe their origin*. But these exostoses are not limited to any individual parts, but are as numerous as the bones themselves: the spine exhibits them throughout; the extremities have them from the semi-ossified cartilage of the senile scapula to that of the coffin bone, and its once cartilaginous alæ *before;* and from the almost anchylosed tail in some subjects, to the semi-petrified toe *behind.* The knacker's repository will furnish the seeker with ample store of exostoses of the cranial and jaw-bones, and of costal also, morbid and accidental. I hardly know a bone I have not seen thus diseased, and those who have viewed the morbid bones in the museum at Alfort will probably remember their variety and number. The *causes* of æquine exostosis may be characterised as remote and proximate, *mediate* or *immediate*. *Pressure* is the principal remote cause, and *inflammation* the proximate: in the human subject, although these causes operate also, yet a constitutional predisposition is superadded to them, from whence the varieties of the affection arise, and its occasional malignancy. A reference to Osteology (Sec. VIII) will shew that pressure in due quantity is the cause of the formation and consolidation of bony matter; hence young animals naturally pursue exercise for this purpose; and thus also, when, by overworking them before the frame is fully established, we hasten the consolidation of the bones, and thus stop the growth of the frame. If the exertions are pushed greatly beyond an ordinate degree, then ossific inflammation follows; commencing occasionally within the periosteal lining, but more often within the ligamentous connexions around, which become the subject of lesions or *strains:* inflammation is the consequence of these, and communicates itself to the periosteum, with which it is in contact. Here, then, pressure, in the form of a distended state of the vascular system, is the agent; for it is thereby roused to an extraordinary deposit of ossific matter from *immediate* ossific inflammation. But exostosis may be, and unquestionably is, the effect of *mediate* inflammation occasioned by mechanical pressure acting in some instances on bones connected together by ligamentous matter only, as the metacarpal splint bones to their appropriate cannon bones, and by which splints and some spavins are formed: in others it is done by *direct* pressure on periosteal and peridesmial surfaces, as in the exostoses of vertebræ, spavins of the cuneiform bones of the hock, and in the ossification, or, according to modern physiology, the *displacement* of the cartilages of the feet. In these cases of mechanical pressure, the earthy matter of bone is, by the stimulus of pressure, deposited between the periosteum and bony surface; the periosteum itself is thereby thickened, while the exostosis or tumour becomes cancellated and structural, like the bone to which it adheres. In these cases the stimulus of pressure is constant; it results from the form, combined with the uses made of the machine. But there are, as already hinted at, cases productive of exostosis where the stimulus of pressure is accidental and momentary, or it is inordinate and often repeated; that is, it is the result of one violent effort or repeated lesser efforts of over *straining* the bodily machine: here we have reason to suppose that the foundations of the most ruinous exostoses are laid within the ligaments, which inflaming, extend the affection to the periosteum, and from thence to the bone under it: ossific inflammation follows the ligamentous, and the result frequently is, that the ligaments become themselves infected, and a bony union takes place between them and the contiguous bone, of which bad curbs and spavins are instances. Some exostoses appear to be accompanied with ulceration; and these, I believe, always commence in the ligaments: the most fatal instances are those which commence by erosion of the capsular ligaments. That species of exostosis observed widely spread over the bones in old horses, is the effect not only of long-continued pressure, but is dependent as well on the unequal forces of deposit and absorption in the latter periods of life; and probably is connected also with a stimulus of necessity, by which the absorbing acting more than the secreting vessels, a slow process, unaccompanied with active symptoms of inflammation, goes on; from whence the articular cartilages particularly exposed to the effects of pressure, as those of the spinous processes of the vertebræ, those of the lateral parts of the feet, and some others, in almost all cases present bony enlargements, the consequence of the deposit of a more solid matter within a new cartilaginous matrix; or the original cartilages may be themselves the nidus for the bony deposit, as we find to be the case with the ligaments sometimes: after which the cartilage may become absorbed, leaving the osseous matter. A morbid disposition to ossific deposit likewise appears to pervade other parts than those immediately connected with the bony base; as within the coats of the large arteries, in the cartilaginous rings of the trachea, the internal parts of some glands, &c. &c., by which nature appears to endeavour to renovate the constitution by consolidating the whole mass; thus warring, as it were, against the universal and inevitable decay of the machine. The *cure* of exostosis must consist in whatever stops the disposition to farther deposit, and removes what has been already produced. In the human subject, these effects have been attempted by constitutional means, intended to act on the absorbents generally; but in the horse, these have not been found to answer any end: local means only are, therefore, resorted to in veterinary practice, and which are principally of a stimulating nature, variously modified, as will be seen under the individual exostoses.

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* The *cartilaginous exostosis between the periosteum and bone* arises from inflammation of the periosteum, and subjacent part of the bone, and a deposition of firm cartilage, adherent to both these surfaces, takes place. In this substance bony matter is secreted, which is first thrown out from the original bone. As the cartilage increases in bulk, the quantity of phosphate of lime augments, and fresh cartilage is constantly deposited upon the outer surface of the tumour. On dissection, 1st, the periosteum is found thicker than natural; 2dly, immediately below the periosteum, cartilage; and, 3dly, ossific matter deposited within the latter, from the shell of the bone, nearly to the inner surface of the periosteum. When the growth of such a swelling ceases, and the disease is of long standing, the exterior surface consists of a shell of osseous matter similar to that of the original bone, and communicating with its cancelli, in consequence of the primitive shell having been absorbed.—*Surgical Essays* of Cooper and Travers.

SPLINT.

Splint, or as some call it *splent*, is the farriers' term for a very common exostosis* situated upon or about some part of the metacarpal bones, usually commencing in the semi-cartilaginous substance which unites the great and small metacarpals, and much more frequently of the inner than of the outer side†. When a splint was attached to the superior extremity of the cannon near the knee, the older farriers called it *osselet;* and, when two small bony enlargements were found near each other, they then named them *fuzee*. One osseous tumour at the upper part of the shank, or cannon, is universally known by the name of splint, or *splent*. This species of exostosis is common to the young horse, from the greater plasticity of his frame, and to his organization being not yet inured to continued exertion. It is usual to consider the consequences of a splint as principally dependent on its situation, and this is generally correct; but a splint may prove painful, and otherwise injurious, although it should not interfere with any tendon or ligament, for the periosteum becomes exquisitely sensible under inflammation and distention; consequently, until it either becomes disorganized or absorbed, it is both tender and painful. This inflammation, fortunately for the animal, is seldom very acute, and the increase is generally slow, which enables the periosteum to accommodate itself to the distention: generally, therefore, when a splint is not situated immediately under a tendon, or contiguous to ligamentary matter, it occasions but little uneasiness, nor does it often lame. But when it enlarges suddenly, or presses on any tendinous or ligamentous moving mass, it occasions not only irritation but lameness also. The veterinary practitioner should, therefore, in his consideration of the *consequences* in these cases, be guided, in a great measure, by the *situation* of the splint. If placed anteriorly, that is, when it exists at the fore edge of the small metacarpal or splint bone, it is productive of much less injury than when placed at its posterior edge; for, as already pointed out, in this latter case, the swelling may press on the ligaments, and interfere with the flexor tendons. For the same reason also, a splint placed at the lower end of the cannon is still more prejudicial than when situated higher up the leg. It is, however, necessary to remark, that it is not uncommon to attribute that lameness to a splint which is dependent on other causes; for, as before observed, splints do not *often* occasion lameness, unless incipient, or very unfavourably situated; it would be well, therefore, to examine every other probable cause of lameness before pronouncing on the evil as arising from a splint. But a splint may, by its situation, or by the extent of inflammation excited within itself, excite also inflammation in the ligaments and tendons themselves: it then, of course, loses all its harmless character, and is not hurtful only, *per se*, but becomes a source of great evil from these aggravations. As the general nature of splint is that of a conversion of what was before ligament into bone, so it is evident, in this point of view, that a splint can seldom, if ever, be wholly removed: but from the process of absorption in the machine in the later periods of life being greater than the deposit, so it happens that the *extra deposit* beyond the simple ossific union, and which extra deposit is that which constitutes the bulk of the splint, is removed in old horses, or, as grooms express it, they 'wear away.' For the same reasons it may, with equal truth, be said, that every old horse dies with splints; as, in almost every instance, the union between these bones consolidates by age, when the stimulus, of necessity, being lost, a hurtful addition to these *natural* splints seldom occurs in them. These observations will be best understood by duly considering what has been urged on the pathology of ossific inflammation.

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* Bracken, the father of the English School of Farriery, derives splint from the circumstance of its serving to strengthen the bone, as thin pieces of wood or splints would strengthen other matter.

† Splint and spavin are both exemplifications of the fact, that these exostoses are principally occasioned by pressure. The small metacarpals and metatarsals, which articulate, one with the knee, and the other with the hock, by means of a cartilago-ligamentous union of an elastic nature, are intended as springs to resist the forces of action and the effects of concussion. But as even elastic springs of every kind will deteriorate by undue stress laid on them, so these interpositions take on ossific inflammation from continued *pressure* in the form of *hard* and violent *work;* by which consolidation takes place in lieu of the elastic medium, and the part acquires strength at the expence of its elasticity.

Treatment of Splints.—Although, as before stated, we cannot restore the cartilaginous union to the bones, yet we can, particularly in the early stages of the disease, promote an absorption of the hurtful and prominent portion of the exostosis; or otherwise, we can hasten the consolidation of the whole, when its tenderness and pain will cease, and its further increase be prevented. The appearance of splints, as much as their hurtful consequences, has occasioned such varied attempts to remove them. In olden times very rough means were used for this purpose, which sometimes succeeded, but oftener left matters much worse than before. Such were thumping the swelling with a hammer; rubbing it violently with a stick; piercing it with a gimlet, &c. An attempt at removal was also made, and is still occasionally practised, by dissecting away the ligaments, when, with a mallet and chisel, the prominent part of the exostosis was chipped off. There is no doubt that, when a splint is very prominent, it may readily be laid bare and removed by means of a very fine saw. This method has been successfully practised; and it is probable that the numerous successful experiments which have been made on human exostoses, by saws expressly adapted to cutting away bony tumours at any depth, without endangering the other parts, will extend this practice also to these exostoses in the horse more universally; and we have also the high authority of Sir Astley Cooper for stating, 'that there is reason to believe that these structures (i. e. *splints*) may, with properly constructed instruments, become much more the subject of operations than they have hitherto been.' Pressure, by means of lead, &c. &c., is an invention also of ancient date, and is even yet practised. Blistering and firing are also very old remedies; while 'sweating' with oil of origanum, and other essential oils, is of patriarchal extraction, and, if not superseded by mechanical removal, will probably last to the end of time. It has lately been the practice to substitute setons for blisters; but these do but half the work of blisters in twice the time, and are apt to leave a blemish into the bargain (see *Spavins)*, in which it does, however, appear, that this method has succeeded in some cases fully, and that after other means had failed. At the Veterinary College, it has likewise been common to divide the periosteum over the splint, by which much relief is said to have been obtained. This plan originated in the treatment of the human node, but which is totally a different affection: it is, however, but likely that where this covering is put much on the stretch, a division of it will give relief. It has also been treated by applying escharotics to the denuded bone after the periôsteum had been divided: the budding-iron has also been applied, from both which benefit has followed; but occasionally much inflammation has succeeded; and in one instance it extended itself among the tendons, and did irreparable mischief: in all, the blemish is very considerable. It is, however, seldom necessary to have recourse to other means than vesication, which, if persisted in by first actively blistering, and then keeping up an irritation by milder means (as blistering ointment one part, lard three parts), for three or four, or even more weeks, will generally complete *all that can be effected.* Or one active blister may be followed up by another, with intervals of a week between. In some few cases, where the ligaments are identified with the exostosis into one tumid mass, it is necessary to apply the highest stimulus with which we are acquainted, which is the actual cautery; and the best method is by a pointed budding-iron.

SPAVIN.

IN the march of veterinary knowledge each of its subjects will afford new matter for new views, as such become illuminated by the lights of anatomy and physiology, or are rendered familiar by experience. It is to be lamented, however, that, as each step is made, the progressor halts, and considers himself as having arrived at the *ultima thule;* Johnny Groat could not place a brick beyond him. For a time all join in his admiration, and see only as he sees, until another adventurer raises a new pedestal or gains a step beyond the former, and the rush of opinion then sides with him also; until another grade, or rather another theory, throws the last also into the same obscurity which has overtaken the former. It is thus that we are found continually vacillating: not halting between two opinions, but between twenty: not so much examining theories by patient research, as receiving them by faith in the theorist.

Spavin, as a very serious æquine affection, may be cited as an example of this: its destructive attack on the utility of the most valuable of our domestic animals has made it a subject of much importance in the veterinary art, and an arena for its disputants. Its nature and seat are not yet settled, although it has been recognized as a dire horse-evil for more than two thousand years. Its importance most certainly well deserves an attentive consideration; I will, therefore, sketch the prevalent opinions regarding it, and endeavour to extract *truth* and *practical instruction* as I and my reader proceed. The eminent veterinary writer whose general account of the nature, qualities, and diseases of the horse, give additional value to the *Library of Useful Knowledge*, offers his opinion of spavin in so instructive a form, that I cannot do the inquiring reader, who has not met with it, a more essential service than to condense it for his perusal. It is observed by this author, 'that the bones of the leg, the shank-bone, and the two little splint-bones behind, support the lower layer of the bones of the hock. The cube-bone rests principally on the shank-bone, and in a slight degree on the outer splint-bone. The middle wedge-bone rests entirely upon the shank-bone, and the smaller wedge rests in a very slight degree on the shank-bone, but principally or almost entirely on the inner splint-bone. Then the splint-bones sustain a very unequal degree of concussion and weight: not only is the inner one placed more under the body, and nearer the centre of gravity, but it has almost the whole of the weight and concussion communicated to the little wedge-bone carried on to it.' From this clear exposition he proceeds to remark, that we need not wonder that the violent actions of galloping, leaping, heavy draught, particularly in young horses, should injure the inner splint-bone, its ligaments, or the substance which connects it with the shank-bone; which *pressure* is further increased, according to his opinion, by calkins placed on the outer heel. 'The weight and concussion,' he goes on to add, 'which are thus thrown on the inner splint-bone produce, in the *first place*, inflammation of the cartilaginous substance which unites it to the shank-bone. The consequence of this is, that the cartilage is absorbed, and bone deposited: the union between the splint-bone and the shank becomes bony instead of cartilaginous; the degree of elastic action between them is destroyed, and there is formed a splint of the hind leg. This is uniformly on the inside of the hind leg, because the greater weight and concussion are thrown on the inner splint-bones. As in the fore leg, the disposition to form bony matter having commenced, and the cause which produced it continuing to act, bone continues to be deposited, and it appears generally in the form of a tumour, where the head of the splint-bone is united with the shank, and in front of that union. This is called *bone-spavin*. Inflammation of the ligaments of any of the small bones of the hock, proceeding to bony tumour, would equally class under the name of spavin, but, with very few exceptions, the disease commences on the precise spot we have described.' In both cause and effect, Mr. Percivall (see Lectures, part 1, p. 352) and Mr. Youatt therefore regard spavin and splint as the same; it is the locality only which alters the name. But is the identity quite so clear? In the last edition of the VETERINARY OUTLINES I conceive that I also erred in straining this analogy too closely, by which wrong conclusions on the cause, seat, and consequences of the complaint may probably be formed. Mr. Percivall himself, seemingly aware of this, observes: 'If however the inflammation extends from this cartilago ligamentous substance (i. e. that which connects the inner small metatarsal with the cannon) to the ligaments and bones of the hock, and terminates there in effusion of bony matter; or if the exostosis of the inner metatarsal bone itself is so placed as to disturb the motions of this joint, *then does a spavin differ essentially from a splint*.' Mr. Youatt also observes on the spread of the ossific deposit; but, as seen, he considers the original seat of spavin and of splint as the same; and he evidently does the same by the cause also; the main truth of which cannot be denied: but I would beg to remark, that such view is too limited both as regards the cause and effect, in my own opinion at least, nor would I venture to differ from such authorities, did the matter not appear to be practically important. It would appear to me, on attentive consideration of the subject, that it is not the *constant pressure* on the inner side of the bony pedestal that is the principal agent in the production of spavin, although in splint it may be so considered; because there the tendency of this pressure to dislocate the inner small metacarpal from the fore cannon appears to be in constant action, which is manifested by the innumerable cases we meet with of splint in young horses. On the contrary, the circumstance that spavin is most common to the mature and aged horse is a sufficient proof that there must be some essential difference between the two affections. Spavin appears to me to result partially only from this uniform pressure on the inner metatarsal bone, but is principally the consequence of a *continuous series of violencies* produced by *inordinate* efforts in supporting burthens, rapid progression, or other extraordinary movements: in fact, from exertions rendered extreme either by their intensity or duration. I would not say that splints are the natural result of the form of the limb; but I would say, that many young horses put out splints from exertions that would not produce spavins. The extraordinary structural strength of the tarsus or hock, and the complexity of its mechanism, sufficiently shew that it had much more to perform than the carpus; consequently the range of variety in its diseases may be supposed to follow in the ratio of its structural complexity and functional importance. In justice both to the ingenious author we have quoted from, as well as to the reader, who will be profited by the matter, we must further introduce what immediately bears on our subject. 'If spavin continues to increase, the bony deposit first spreads over the lower wedge-bones, for these are nearest to its original seat. They are capable of slight motion, and share in every action of the joint, but their principal design was to obviate concussion. The chief motion of the joint, and that compared with which the motion of the others is scarcely to be regarded, is confined to the tibia and the astragalus, and, therefore, stiffness rather than lameness may accompany spavin, even when it is beginning to affect the small bones of the joint. Hence, too, we see the advantage of these bones having each its separate ligaments and membranes, and constituting so many joints, since injury may happen to some of them without the effect being propagated to the rest. When the bony deposit continues to enlarge, and takes in the second layer of bones, the larger wedge-bones, and even spreads to the cube-bones on the other side, even then the lameness may not be excessive, because these two are joints, or parts of the joint, in which the motion is small; but when it extends to the union of the tibia and the astragalus; when the joint, in which is the chief motion of the hock, is attacked, the lameness is indeed formidable, and the horse becomes nearly or quite useless. A recollection of the situation of the different bones of the hock may, in some measure, guide the purchaser as to the probable value and use of the spavined horse; but he must not depend on this, for deep-seated deposits of bone, which the eye cannot reach, may interfere more with the action of the joint than any outward enlargement, however great.'

To pursue my account of the opinions entertained on spavin by eminent professors of the art, I shall next quote Hurtrel d'Arboval, who also regards spavin as an exostosis that occurs at the superior internal and lateral part of the cannon bone of the hind leg. It generally occasions lameness, and is of the nature of curb and other exostoses; and the treatment which is employed for curbs and exostosis generally is equally applicable here. Mr. Percivall's excellent definition of spavin is, that it is an exostosis 'upon or near to the inner and lower part of the hock. In its origin and progress it is very similar to a splent; indeed, it may be, in reality, purely a splent; although from its situation we should denominate it a spavin. To explain this, a spavin may, and commonly, we believe, does arise from an inflammation of the cartilago-ligamentous substance connecting the head of the inner small metatarsal to that of the cannon bone, without any accompanying disease of the bones of the hock; and this, terminating in ossification, may be a splent as to its nature, but is a spavin as to its situation. If, however, the inflammation extends from this cartilago-ligamentous substance to the ligaments and bones of the hock, and terminates there in the effusion of bony matter; or if the exostosis of the inner metatarsal bone itself is so placed as to disturb the motions of this joint, then does a spavin differ essentially from a splent. To elucidate this point still farther: if the exostosis, instead of making its appearance just beneath the hock, is seated about the body or lower extremity of the cannon, it constitutes a splent of the hind leg; a disease, however, of but rare occurrence, owing to the bony deposit commonly appearing at that part where inflammation is first excited. Although a spavin, at the commencement, may be confined to the metatarsal bones, it seldom happens that those of the hock do not ultimately partake of the disease; and this will account for the various degrees of lameness and stiffness observable in that joint: indeed, we have little doubt but the external parts, the vascular lining of the joint, become eventually diseased; so that the synovia is unnatural either in quantity or quality, or, perhaps, both, to which is chiefly referrible the explanation of the fact, of spavined horses improving in their action during work. In almost all cases of inveterate spavin, the cuneiform bones are united together by a layer of ossific matter, extending upwards from the inside of the large and inner small metatarsals; so that there is no longer any motion whatever between the small bones of the hock and those of the leg: very commonly, also, the same sort of union renders the os calcis, as well as the os cuboides, fixed in their places.'

Mr. Goodwin, well known to the veterinary world as an eminent practitioner and valuable writer, considers the seat of spavin to be '*in the synovial membrane* *that covers the cuneiform bones:*' it is here also, Mr. G. conceives, that spavin generally commences. With every deference to this gentleman's opinion, is this view also not too limited? And does not every day's experience disprove its being confined to this situation, or of its commencement from such an origin in the majority of cases? Mr. Goodwin has done the profession at large much service by his researches on this subject: and there is little reason to doubt that many, nay most of the cases of tarsal lameness, *without much enlargement of the hock*, and which from thence are calculated to deceive, and become attributed to strains and affections in the '*round bone*' or '*stifle*,' are derived from this source. 'This disease of the synovial membrane of the cuneiform bones,' it is observed, 'had not been named by any one: it had been confounded with exostosis, because exostosis was an occasional consequence of it. Mr. G.'s opinion was that spavin did not commence with an enlargement of the hock, but with lameness, from inflammation and ulceration of the synovial membrane. Exostosis was a subsequent affair. Common spavin, however, was, in the commencement, an exostosis. Over-exertion had produced inflammation in the substance between the metatarsals, and had packed the bones together: over-exertion was likewise the probable cause of the inflammation of the synovial membrane of the cuneiform bones.'

If future researches should prove the frequent existence of these cases, to derive from the discovery all the benefit the art may expect, it would be much better not to confound it with the farriers' '*bone-spavin*.' Such a view would greatly mystify the pathology of occult hock lamenesses, where spavin is always supposed to shew itself in the form of exostosis: and without which not only is spavin disallowed, but also lameness itself denied a station without it, and a hunt made for it elsewhere. Mr. Youatt's observations on this subject (*Veterinarian*, vol. iii) are in unison with this view, and merit much attention*. To add to the varied seats of spavin, it has been asserted to be particularly frequent on the surfaces of the prominent ridge of the tibia and the corresponding furrow of the astragalus: but one or two cases do not establish any speciality in favour of this habitat†.

Spavin may, therefore, be characterised as exostosis of some one or more of the tarsal bones, or ossific inflammation of the ligaments which connect them with each other. It may also be considered, *that it has no determinate seat*, but is more often found on the inner than the outer side of the hock. It also frequently affects the surfaces of the cuneiform bones, whose ligamentous connexions it ossifies, and whose surfaces it ulcerates sometimes. It is equally true, that its effects are not to be measured by the dimensions of the exostosis, as these are sometimes great without corresponding lameness; and that it is a character of the affection founded on the lessened irritability and increased absorption which warmth, friction, and mental excitement occasion, to render the horse less lame as he progresses, and which will assist to distinguish it from other affections. These affections, however, lame the animal more or less, according to their situation. A spavin of the cuneiform bones usually lames more than that which is lower down and affects the metatarsals only. Neither do spavins, when arrived at a certain state, usually increase; consequently spavined horses for some purposes may prove very useful. In moderate and slow work they are even amended frequently, and last many years; but in bad cases the fear of lying down prevents their thriving. Thus post-masters and stage-coach drivers are not often willing to purchase badly spavined horses, or any others with permanent lamenesses behind, although they do not reject the foundered or groggy horse. Lamenesses before force the horse to lie down; those behind often prevent him doing this, from an instinctive dread, that when once down he cannot rise again; and these persons are well aware that the horse who lies most can work most.

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* 'Various diseases of the hock had been confounded under the name of *spavin*; but, in his mind, there was as much difference between the common spavin (the bony union between the metatarsals and the exostosis frequently consequent on it), and ulceration of the synovial membrane of the cuneiform bones, as there was between the navicular joint disease and any other disorganization of the internal structure of the foot. They might be connected, but were perfectly distinct. They might run into each other; one might be the consequence of the other; or each alone might pursue its course, and produce permanent lameness. He could wish that the term spavin should be confined to that enlargement connected with the bony union of the metatarsals, which veterinary writers and horsemen had uniformly distinguished under that term; and that some other and appropriate name should be given to the inflammation and ulceration of the internal structure of the hock, and particularly of the cuneiform bones, which Mr. Goodwin has so excellently described. This distinction being made, he was much mistaken if the veterinary public would not soon acknowledge itself as much indebted to Mr. Goodwin for the discovery, or at least the elucidation, of a frequent, and obscure, and unsuspected cause of lameness behind, as they will to Mr. J. Turner for the light he has thrown on as frequent, and obscure, and previously unsuspected cause of lameness before.'

† As the invasion extends itself over every portion of the hock, it is evident this will also sometimes happen; but that it is a frequent one, or to be considered as the head-quarters of spavin, is clearly erroneous. Were this the case, all such spavins would lame a horse beyond any capability of ordinary progression; for on the admirable pulley-like adaptation of the tarsal extremity of the tibia with the astragalus the motions of this joint principally depend: whereas it is notorious that lameness is not always the consequence of tarsal exostoses; on the contrary, many horses have them without lameness, at least without so much as materially interferes with progression. The articulating surfaces of the tibia and those of the astragalus, which mortice with each other, cannot therefore be one of the strong holds of this parasite

Treatment of Bone Spavin.—This does not differ from that of splint, except that, as it is much oftener a cause of serious lameness, and occurring as it commonly does in older horses, from the effect of long-continued exertion, so it also proves more obstinate; and the treatment required, therefore, should be more active. Among the older farriers, who, like some of the moderns, think nothing too strong for a horse, violent mechanical operations were resorted to, to remove spavins as well as splints; as the mallet and chisel to chip it off, boring the exostosis with a gimlet, punching it with a hot iron, or applying caustics; the first removing it mechanically, and the three latter methods destroying its vitality and promoting its exfoliation. As might be expected, for one case which succeeded (and in some it certainly did succeed), in many it increased the lameness, or ended in anchylosis, and sometimes in death. But the very few successful cases gained by these violent means still give the practitioner without professional character a decided advantage over the regular veterinarian; for should the former, by these violent means, destroy his patient, he only stands where he did; but if he cure him, all the world is told that he has effected that which the veterinarian could not do; that is, what he dare not attempt. As with splint, it is not improbable that instruments may yet be devised which will operate on these bony enlargements without risk; though the chances are fewer in the hock, from its connexion with capsular and bursal ligaments, than in the fore leg. The *treatment* pursued by veterinarians of the present day varies somewhat; those bordering on the old school still rub them with some violence, and then stimulate them with ol. origanum, ol. terebinth. &c. &c. Those of later date blister and fire. At the Veterinary College setons are used, by nipping up the skin and pushing a seton-needle armed with tape through it, so that the tape within the skin exactly opposes itself to the spavin. If the skin be tender or tumefied, it is more proper to make an opening above and below the exostosis, and to push a *blunt* seton-needle, or eyed probe, from one opening to the other, armed with the tape, which should be daily smeared with mild blistering ointment, or common turpentine. In this way, report says, the College practice has proved very successful, and therefore merits trial. Blistering I have, however, found, when repeated over and over, and particularly when mild intermediate stimulants have been kept applied, as a weak ointment of Spanish flies, or oil and turpentine, &c., has commonly proved equal to all the benefit these obstinate cases can receive; for when the bony deposit is fully formed, it is in vain to expect its entire absorption: even its partial absorption is often frustrated. Our principal hope lies in removing that inflammation which is the existing cause of much of the pain, stiffness, and tumefaction in the ligaments around, and likewise in preventing the increase of the bony deposit. Our hopes of success must also greatly depend on the time of the existence of the evil. When it is early attended to, before the bony deposit has gained its full solidity, stimulants act more favourably, and lessen it more materially. It remains to add, that, when repeated blistering fails, the more active method of promoting absorption by firing may be tried, carefully avoiding to fire too actively or deeply, otherwise the integuments may be penetrated, and a dangerous inflammation and sloughing of the ligaments follow *.

CURB.

It has been so long the custom to rank curb with exostosis, that in the former editions I yielded to it, and entered on the description and treatment of it in this place, and which was not altogether improper, for we have seen that it does sometimes extend itself to the tarsal bones, when its *treatment* must follow that of exostosis generally. But as *curb* is not originally an affection of the bones, its full consideration is referred to tendinous and ligamentous extensions or strains, to which it properly belongs.

RING-BONE.

This is an exostosis surrounding the whole, or part, of the circle of the coronet. Sometimes there are only two lateral swellings; but, although the situation is no further varied than this in the different cases which occur, yet the parts affected are very dissimilar, and the degrees of lameness by no means the same. In very upright pasterns, either originally so formed, or having become so from ligamentary contractions, or from heels allowed to gain a preposterous height, the articulary surfaces of the bones become so perpendicularly opposed to each other, that great jar is sustained during motion, and inflammation is either excited in the ligaments, cartilages, or bones themselves; by which an osseous deposit takes place, either around the coronary ligament, or around the extremities of one or both pastern bones. When the deposit takes place within the lateral cartilages, the prominence is not circular, but on each side of the foot; and these cases, which are common to aged and hard-worked horses, are not in general attended with so much heat and lameness as those which extend around the coronet, and have the pastern bones or coronary ligament for their seat. *Ring-bones* are not uncommon among colts at the time of their backing, from the ruinous weights of a heavy rider over rough or ploughed ground, and from their being thrown on their haunches during their training, and which effort is, perhaps, the reason that they are more common to the hind than to the fore feet.

The *treatment* of a ring-bone resolves itself into attempts to reduce any considerable inflammation which may exist, by bleeding at the toe, and poulticing with bran and diluted vinegar around the foot, until active inflammation be abated. After this, blister the coronet, and keep up the inflammatory action of the blister for a month. If the ring-bone be still in the same state after this period, proceed to fire; and again blister over it, as the inflammation subsides †.

Exostoses of the Coffin and Navicular Bones are still more common; indeed, the coffin bones of old horses are seldom seen without them: it is equally common to see the lateral cartilages absorbed, and their place supplied by bone. It is curious to observe the vast varieties in these deposits; in some, the coffin is increased to a grotesque form, totally distinct from the original. In a few, the absorption is greater than the deposit, but this is not frequent. The navicular bone becomes sometimes incrusted also with osseous matter, and the sensible laminæ do not escape a singular incrustation. Can we, therefore, wonder at the stiffness and disinclination to unusual exertion in old horses? or can we be surprised that these affections are so irremediable in them? (See *Groggy Lamenesses.)*

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* By a reference to firing (among the Operations) it will, however, be seen, that occasionally benefit may be derived, in extreme cases, by extending the cauterization beyond these limits. It is unquestionable that desperate diseases will require desperate remedies, and this the more as the constitution will often repair very violent and extensive disorganizations from accidental causes, when it refuses to do so by direct morbid affections.

† 'Le feu doit être appliqué en raies profondes, avec des pointes rapprochées; c'est de cette manière que Girard (de la Sarthe) l'appliqua à un cheval qui portait une forme plus grosse que le poing, et qui put ensuite reprendre son travail accoutumé, auquel il n'était plus susceptible de fournir auparavant; le volume de la forme diminua d'un tiers. Dans le repos, l'animal s'appeuyait sur le membre lésé, ce qu'il ne ne faisant jamais avant la cautérisation. Quoi qu'il en soit, la forme est toujours une lesion opiniâtre le longue, très difficile et très rare à guérir. On n'a plus rien à faire quand on a mis le feu, seulement on peut-mettre le cheval dans une prairie basse, et l'envoyer de temps en temps au labour, afin d'observée s'il se retablira assez pour pouvoir fournir par la suite a des services plus suivis.'—*Hurtrel d'Arboval, art. Forme.*

ANCHYLOSIS.

When ossific matter is deposited within or upon the extremities of bones, or within or upon the capsular and investing ligaments, so as totally to destroy the flexibility of a joint, it is called *anchylosis*. This tendency is manifested in a very great degree in the horse, as might be expected, from his being so subjected to continued and violent exertions, tending to put all the parts on the stretch, and, by the stimulus of exertion, to press all their powers to the top of their action. Few of the joints of the horse escape the chance of anchylosis, as few of his bones are out of the ordinary reach of exostosis. The joints of the spinal column, particularly of the dorsal and lumbar vertebræ, are very frequently the seat of these affections, which seem to be occasioned by the heavy weights imposed on these animals. It is this affection which renders old horses stiff, and in some instances unwilling to lie down, or when down to rise up again. (See *Osteology*.)

Anchylosis of the Knee and Hock is likewise not uncommon from punctures into the cavity of the joint, either by accident, or by the lamentable ignorance in the treatment of their medical or rather non-medical attendants.

Anchylosis of the Pastern and Coffin Joints is also not unusual. One cause appears to be ulceration of the articular cartilages. (See *Navicular Joint Disease.)* Another is the inflammation of the ligaments, from an unfavourable opposition of the bones of the pasterns, gained either by excess of exertion, and then called knuckling, or by that malconformation called upright pasterns. In these cases the tendons and ligaments are ever on the stretch, to rectify the unnatural line of the limb, and to prevent the shocks of concussion, which eventually terminate in a deposit of ossific matter in and around them; this soon communicates to the bones, and these joints become finally anchylosed*. From what has already been said, it will be evident that no *treatment* will be effective in promoting a perfect cure in any of these instances; we can only palliate the symptoms by the means before detailed in Exostosis.

CLASS XVIII.

DISEASES OF THE EYE.

SIMPLE INFLAMMATION OF THE EYE.

This common or accidental inflammation must be distinguished from that known as the specific or periodical ophthalmia, the course of which ends in cataract: this, on the contrary, usually yields readily to medical treatment: in most instances it would meet a natural cure. The diseases of the eye have a consequence on the horse unknown to man, who, having one affected, is still able to perceive objects distinctly with the other: the horse, on the contrary, has his axis of vision so directed that he sees different objects with each eye; consequently, when blind of one eye, all objects on that side are shut out from his sight. It is said to be a fact, that a blind horse has a smooth coat in winter and a rough one in summer. Nimrod says it happens to nine out of ten. We relate it as we have received it. There is also another evil connected with an inflammatory affection of the eye in the horse resulting from this division: which is, that during any affection of one the horse is startlish and timid in the extreme, from objects presenting themselves indistinctly on that side: when both eyes are affected, he is, of course, more so. It is but seldom that this inflammation has other than a mechanical origin: blows, lesion of the conjunctive coats from the lash of the whip, hay-seeds, or other matters falling within the eyelids, and not being removed by the action of the nictitating membrane, are common causes. It now and then, in a mild degree, is an accompaniment of catarrh; and likewise occasionally appears the consequence of a direct attack of cold centering itself in one or both of them; such cases, however, are rare, and should always be looked on with extreme suspicion, as partaking of the specific ophthalmia. According to Hurtrel d'Arboval, the simple ophthalmia has other causes than external injuries, or being symptomatic of catarrh; for he describes it as epizootic[*], and as spontaneous from other causes also. It can likewise, according to him, degenerate into the puriform[†]; a state very rare, if ever known, in English veterinary practice; while chemosis, very unusual with us, appears not an unfrequent result of it in France[‡]. I must, however, observe, that on no disease of the horse is this otherwise excellent and instructive author so unsatisfactory, in my opinion, as on this. He multiplies the causes of it and the forms it assumes unnecessarily; and many of his descriptions, intended to apply to the ophthalmic affection I am now treating of, ought to be appended to specific ophthalmia.

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* Morbid specimens of anchylosis are met with in sufficient numbers at the London horse slaughterers, and in the cabinets of veterinarians. Mr. Percivall observes, that from 150 anchylosed specimens of pastern and coffin-joints, there were five of complete anchylosis of the fetlock; forty ditto of the pastern; eighteen ditto of the coffin: of them there are only four in which the navicular joint does not participate: seven of complete anchylosis both of the pastern and coffin-joints; the others present incrustations only, more or less extensive.

The *appearances of simple inflammation of the eye* are principally to be distinguished from those of specific ophthalmia by the circumstance, that, except in cases of unusual intensity, they are such as characterise affection of the conjunctival surfaces only; whereas, in the other case, the internal parts of the globe participate, and it is probable that they are the parts primarily attacked; whereas in the most acute cases of *simple* inflammation, any internal attack is only consequent to the ophthalmic state of the conjunctive coats. Another assistant guide in distinguishing between the two is, that here there is seldom any disturbance in the system, as symptomatic fever, impaired appetite, and harsh dry skin. There are, however, the same impatience of light denoted by closed eyelids; the same distention of the vessels and reddened hue of the conjunctive coats, as well as the haw inflamed and protruded: sometimes the pellucidity of the cornea is disturbed. From that sympathy which is found to exist between double organs, even when the affection has been entirely brought on by violence done to one eye, the other will by sympathy become affected also, but in a minor degree. Of this liability the practitioner should be aware, as a mistake in this particular might lead him into several important errors.

The *treatment* must commence by a careful eversion of the eyelids, in case the cause is not otherwise apparent, and due examination to detect any extraneous substance which may have intruded itself; which must be followed by its removal, as well as by such local and general bleeding, and such applications, as the intensity of the inflammation requires, of which further notice will be taken in the next article.

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[*] 'L'opthalmie dite epizootique n'est pas tres rare; ou l'observe annuellement dans certain cantons, c'est-à-dire qu'elle y reparait presque chaque année, aux mêmes époques et dans les mêmes circonstances. On l'a observée en Flandre dans l'ete de 1781; on l'a attribuée alors à la chaleur excessive de la saison, et à des fourrages chargés d'insectes que les habitans du pays appellent *onningues*, et que nous ne connaissons pas autrement. Elle a aussi régné dans les départemens du Nord et de l'Eure pendant les etés de 1800 et de 1801. Les symptômes de l'ophthalmie epizootique observée en Flandre dans l'ete de 1781, étaient la cécité, la tumefaction de la glande lacrymale, la suppuration du bulbe dans plusieurs sujets, dans tous la tristesse, le dégoût et la fièvre.'

[†] 'La suppuration, le trouble des humeurs, des abcès dans les chambres de l'œil, l'opacité de ses membranes internes, et même la rupture du globe, tout est à craindre dans l'ophthalmie interne qui s'ajoute à l'ophthalmie externe, si l'on ne parvient pas à maitriser l'inflammation et à la résoudre, ce qui est souvent fort difficile.'

[‡] 'Cette grave ampliation de l'ophthalmie *(chemosis)* provient, ou de la force de l'irritation des parties affectées, ou de la négligence dans l'emploie des moyens antiphlogistiques. Après les saignées generales pratiquées dès le principe, la diète et les boissons délayantes, ce qui serait le mieux consisterait en d'abondantes saignees locales; mais la difficulté de les pratiquer, et celle plus grande d'obtenir beaucoup de sang pendant long-temps des veines qui environnent d'œil, ne permettent pas de beaucoup compter sur l'efficacité de ce moyen. Celui qu'on pourrait tenter pour le suppléer serait d'inciser, avec des ciseaux courbes sur leur plat, tout le bourrelet, inflammatoire; il en résulterait une abondante hémorrhagie très propre à apaiser les accidens.'

SPECIFIC OR PERIODICAL OPHTHALMIA.

THIS ruinous affection of the eyes is distinguished from the former by its constitutional nature; it is also characterised by its being deeper seated. Indeed, I am disposed to think that its original attack is made on the inner structure of the eye[*] in many, if not in all instances; and that from this the inflammation extends over the conjunctive coats; in which case *ophthalmia membranarum* is a less proper term for it than *ophthalmitis*, which is applicable as well to inflammation of the whole bulb, as to that confined to its membranes. A precise knowledge of this disease was long withheld: among the French even, it was not until Bourgelat had been succeeded by Chabert, that it became characteristically developed. Chabert it was who first shewed its specific nature, and its isolated state from simple phlegmasiæ of the organ brought about by accidental circumstances. He first distinctly proved that it was a constitutional affection inherent in the structure of the organ. Among our own countrymen it was long regarded as having its origin in occasional causes, as local injuries, &c.: even the protrusion of the haw and its tumefaction and discolouration, though a symptom only of the affection, were often mistaken for the cause of the disease; and the treatment was more than a match for the error, which was the cutting off the protruding portion. It is to Mr. Coleman that we are indebted for the most ample information on the subject; and it was to his early and exclusive attention to it, probably, that the art received the benefit of his future researches throughout its wide field. It would have been happy for us had his inquiries been crowned with equal success as regards the curative treatment of it; but here he, in common with others, can offer little more than the result of his unsuccessful though ingenious attempts.

The *appearances* which accompany the affection are not always the same: those more commonly present are swelled eyelids, which appear nearly closed, and when separated exhibit a sunken retracted eyeball, giving the eye the appearance of being diminished. This arises from the retractor muscles acting to withdraw the eye from the stimulus of light, which appears in every case of active inflammation to give extreme pain, and the horse is apt to resist every effort to force open the lids for inspection, particularly if it be in front of a strong light; but turn the head away, and the animal will unclose the eye and exhibit its features. This retraction of the eye at the same time forces the haw over a portion of its globe, where it is seen swelled and preternaturally red, from its participation in the disease; and which addition to its size and colour has, among farriers and horsemen, long subjected it to the accusation of being the cause, instead of the effect, of the disease. The inner surfaces of the eyelids will be found highly vascular and hot, pouring forth, in most instances, a flood of tears, which continually trickles down the face in successional scalding drops, and the whole conjunctiva will present a net-work of turgid red vessels over its opaque and naturally white surface: such is the distention of the vessels, before intended to carry only the colourless parts of the blood, that they not only tinge the opaque cornea, but are seen obtruding their red lines into the transparent cornea also, which sometimes suffers an effusion of a dull yellow colour. If the pupil be not too much contracted or too turbid, we shall discover the aqueous humour thick and muddy also; the iris and choroid will likewise be found altered from their natural colour. From this state it follows sometimes, that a central yellow patch is discovered at the bottom of the eye, in which case matter has formed, but not from the usual suppurative inflammation; for it commonly becomes absorbed again, and sometimes very speedily. In very acute cases, however, there is a large deposit of fluid, which disorganizes the eye, or now and then proceeds to evacuate itself by an abscess of the globe; but these are extreme and rare cases. The rapidity of the changes in the state of the eye is a very marked feature of specific ophthalmia; and the transition from a most opaque to almost a clear state of the cornea, and from a simple dimness in the appearance to a perfect opacity, sometimes takes place in a remarkable short space of time. I have seen an eye opaque within and without, which was merely dim the night before; and perhaps, within twelve hours, it would be the same again, without any apparent medical agency. This extreme activity of both the depositing and the absorbing vessels is peculiar to the brute eye; in the human these changes are less rapid, which has been attributed to the coagulable lymph in the human eye rupturing its minute vessels and becoming extravasated; but in the brute eye, to its remaining within its vessels. This, however, cannot be the sole acting cause, since, from our present physiological theory, it is natural to suppose that the fluid must be extravasated, before it can be absorbed; consequently it would disappear, under this view of the matter, quickest in the human subject. It is really dependent on the greater energy of the absorbing system of the horse under the inflammatory action in these cases.

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[*] Mr. Wardrop says, 'This inflammation is seated in the internal parts of the eye-ball, affecting more particularly the choroid coat and the iris.' Mr. Percivall observes that 'even the aqueous humour grows turbid, and that the iris in some cases turns of a dead amber hue; the corpora nigra lose their jetty blackness, and the pupil becomes so contracted as to be with difficulty seen through.' Hurtrel d'Arboval has, 'Ophthalmie periodique se reconnait au trouble de l'humeur aqueuse, déterminé lui-même par l'irritation de la membrane qui tapisse la chambre antérieure, même les deux chambres, et se termine par la cataracte et la cécité.'

In the above detail of symptoms, it is the *active* inflammatory state which has been described, and is frequently so sudden in its attack as to gain almost its maximum in a few hours, which has led inexperienced persons to look for the cause in blows, irritating matter falling into the eye, as hay seeds, stings of wasps, bees, &c. It is not, however, in every instance thus violent, nor thus sudden; on the contrary, it sometimes approaches more slowly, when the impatience of light is not remarkable, and amounts only to a winking of the lids, and moisture from tears, when brought into the full glare: the globe of the eye looks rather yellow than red, and within it is only slightly disturbed with a discoloured muddiness. The haw is here hardly apparent, the eyelids are less swollen and gorged, and the tears pass in their natural channel, the eye or eyes remain without much variation many days, and sometimes weeks even. This apparent mildness of symptoms is not, however, a prognostic of a less formidable disease, for this proves usually as obstinate and as eventually fatal to vision as the other. Among the other peculiarities between ophthalmia of the human and of the horse, one is, that it usually attacks both eyes in the former, whereas it is by no means unusual for it to attack one only in the horse, leaving the other totally unaffected, or at most only sympathetically so, but without specific affection. Equally worthy of remark, is the complete and sudden metastasis which often takes place in this monocular ophthalmia[*]. From being in a very aggravated state of inflammation in one eye, it will suddenly shift its seat to the other, leaving the original much amended or nearly well: and it must have been this *intermittent* type which first gained it the term of a *gouty affection* from Mr. Coleman; a term, perhaps, which is not altogether applicable, but by no means deserving of the ridicule which has been attached to it. Its specific character has also been attacked; but I believe that its general nature, and the singularities it maintains, can by no other term be so justly expressed. It has been observed, that when the disease is attended with tumefied lids and much weeping, it usually attacks both eyes; but I have not unfrequently seen it confined to one only. It is also asserted, that under ophthalmia a horse rarely sweats, and that when he does it is not a favourable perspiration, but a cold clammy one, which is not unlikely from the symptomatic fever present, which sometimes runs high. There does also appear a somewhat distinct sympathetic connexion between the eyes and skin in these cases; which latter is usually harsh, and what is called unthrifty.

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[*] This metastasis is not confined to the change from eye to eye only, but from the eye to other organs also, and *vice versâ*. Inflammation of the laminæ of the feet has been thus changed, and the eyes also have occasionally brightened at the expense of the laminated structure. Mr. Castley observes, in *The Veterinarian*, that he has seen periodical ophthalmia supervening on some disturbed state of the system, as from diabetes brought on by mow-burnt hay, or kiln-dried oats; of which he had many instances in the three years in which the army of occupation remained in France after the battle of Waterloo, where very many horses went blind apparently from this source only.

The *periodical* nature of the complaint is such, that, having once made its appearance, there is almost a certainty of a recurrence of its attacks at indefinite periods, which the older farriers usually estimated at about a lunar month; and hence supposed that the moon had some influence on it, and therefore named it *lunatic* or *moon-blindness*[*]. We need not deny this absurdity—it denies itself; for it recurs at indefinite periods, as from two or three weeks to as many months. It is always observed, that the first of these inflammatory attacks, however violent, having arrived at its height, usually gives way to medical treatment, or the disease leaves the horse of its own accord, and the eyes recover *nearly* their former appearance: I use the term nearly, because they are seldom so perfectly transparent as before; on the contrary, by a narrow inspection, there will be observed either some small opaque spots within the pupil, or the general cornea will not be so distinctly clear as before; or even should the centre of the cornea be perfectly transparent, yet there will commonly remain some cloudy lines around its extreme circumference. This latter appearance should always be particularly attended to, for this is the very last part the opacity quits; and, I believe, in an eye once affected, *this* hardly ever wholly leaves the extreme edges. The eye or eyes, however, *thus far* recovered, seldom remain very long sound, but something again calls the diseased action forth, and the complaint recurs with its former violence and its former appearances. As these attacks are repeated, they leave the eye less transparent each time; sometimes a very small white speck is left within the humours, which may be seen through the pupil. This opaque spot forms a nucleus for future and rapid accretion: sometimes, however, it will remain stationary a long time, and now and then it never enlarges. But, usually, repeated inflammatory attacks succeed each other, and the whole crystalline lens at last becomes opaque, when the disease takes the name of *cataract*, in which almost all these inflammations terminate. It is remarkable, likewise, when the process of forming cataract is become fixed and regular within the crystalline, that active inflammation usually leaves the coats of the eye, and seldom again returns.

Causes.—It has been conjectured, that the *remote* cause of this disease arises from the plethora which takes place in horses at the adult period; that is, when they have just attained their growth, and at which time it is observed they are more frequently first attacked with it; for till this age the blood has not only to nourish the body, but to increase it also by the addition of parts; but after maturity, having only to support the organs it has already formed, there must be a *superabundant quantity* thrown on the system: at this period, likewise, the vascular action is strong, and much subject to distention. This theory, however ingenious, is by no means sufficient to account for the constitutional predisposition so evident to this disease, for it is by no means confined to the adult period[*]; and even barring this objection to its correctness, it yet remains to be accounted for, why the eyes should be, of all the organs, the only ones attacked, seeing the plethora is universally distributed; and why also the complaint should be confined to the horse, and not take place in any thing like an equal degree in the mule and ass at their adult periods, even in those countries where the treatment of them is equally luxurious with that of the horse. It is, however, in such countries more frequent with these congeners than with us, which is a sufficient proof that a life of art increases, if it does not altogether beget, the tendency to it. We have, however, by a source of extensive observations, pretty clearly established its hereditary nature: the constitutional disposition, dependent undoubtedly on structural speciality, does descend from the parents of both sexes to the offspring; and this knowledge may be hereafter turned to account by our breeding only from such parents as have not this aptitude; by which, if we fail to cure, we may greatly prevent*. Colour has been thought to influence the liability to the affection; but no two persons agree as to the shades most obnoxious: the wall-eyed horse, by general consent, is, however, said to be exempt; yet Mr. Castley met with two cases of this kind in one regiment. Size of body, however, has certainly some connexion with it, for blindness is much more rare among ponies than among larger horses; and it is the general opinion, and one which appears founded on experience, that small retracted eyes, particularly in the heads of coarse fleshy horses, are more predisposed to disease than others.

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[*] Gervaise Markham has, 'Now they be called *moon-eyes*, because if the farrier do observe them he shall perceive that at some times of the *moon* he shall see very prettily, and at some times of the *moon* he shall see nothing at all. Now the signs thereof are, when the horse's eyes are at the best they will look rather yellowish and dimme; and when they are at the worst, they will look red, fiery, and angry.'

[†] It is seen in colts and fillies of every age. I have seen it at two years old. Hurtrel d'Arboval and other French authors assert similar cases. Mr. Castley saw in Ireland two blind three-year-old colts, one of which had never been housed; but both had become blind by specific ophthalmia. It is also worthy of observation, in proof of the hereditary predisposition to cataract as paramount to all occasional causes, that it is more prevalent in Ireland than in England. During my military services there, where it was common to summon a vast number of cars for the transport of baggage and ammunition, I was surprised at the number of blind horses: they are not, I believe, so common now. At the time I allude to, it was not to be supposed that it was to any artificial modes of life that this prevalence was observed, but to the usual habit of breeding from blind horses and mares. Mr. Castley remarks on a blind stallion called Chanticleer, in very great repute, whose disease formed no bar to his selection as a stock-getter.

The *occasional* causes are probably various. A determination to the head must be the consequence of the exertion which a horse is exposed to when he is first put to active and laborious exercise, particularly that of drawing; and this, as he is unused to it, must act considerably in *distending* the vessels of these organs. Hurtrel d'Arboval lays much stress on *dentition* as an occasional cause; and in this process it is certain much blood must centre about the parts. Early breaking horses into harness by collar pressure must also hinder the free return of blood from the head, and produce congestion. The French authors are much impressed also with the tendency of some food, and with the nature and quality of some pasturage, in the production of this and also of the simple ophthalmia. Clover seems to lie under this tax. Hard food, they think, by exciting much mastication, may produce it; but which is much to be doubted. There is, however, great reason to think that disturbances in the digestive functions, as we have seen in the case of musty hay and kiln-dried oats, are predisponents†. The acrimonious fumes of a hot foul stable, to a young animal that has been only used to a barn and paddock, may call forth the *liability* into action, and thus may prove an occasional cause; but when we see so many horses in the stables of inns, coachmasters, &c. &c., and farmers' horses and others, who are more naturally treated, still subject to it, this cannot wholly account for the disposition. There is no doubt also but accidental plethora, however gained, at any time predisposes to it; and likewise inflammatory affections of other organs may, by translation, prove a cause: and cold applied in any way frequently calls the disposition into action.

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* Too much publicity cannot be given to this hereditary tendency, nor to the collecting all the proofs of its existence. Hurtrel d'Arboval observes, 'C'est surtout à l'occasion de certains maux d'yeux et de leurs suites qu'on a établi l'herédité des maladies. Huzard père, dans son instruction sur l'amelioration des chevaux de France, publiée en l'an X (1802), et qui n'a pas été réimprimée depuis, conseille de rejeter des haras les jumens affectées de *fluxion lunatique* parcequ'on a observé, dit il, qu'elles communiquent à leurs poulains cette affection périodique. Bourgelat avertit de prendre garde, dans le choix des étalons, à toute disposition maladive sujette à être transmise, est il range dans cette catégorie les maux d'yeux qu'il appelle essentiels. Gursault pose le même principe, et signale particulièrement les yeux faibles, la fluxion habituelle et a fluxion périodique de ces organes. Cette dernière est considerée, par Lafosse, comme souvent héréditaire. Nous savons qu'on a réformé des étalons, dans les dépôts entretenus aux frais de l'état, par cela seul qu'on a cru remarquer qu'ils transmettaient à leurs produits des prédispositions à la cécité. Plusieurs vétérinaires nous ont assuré que des poulains issus de père et de mère lunatiques, se sont montrés aptes à contracter des ophthalmies, principalement à l'époque de la dentition et surtout de la sortie des crochet.' In the *Recueil de Med. Vet.* for March 1829, is a paper purposely written by M. Marripoey, for the Royal Agricultural Society of France, on the subject of the hereditariness of periodical ophthalmia, where the direct proofs were numerous, and admitted of no doubt that this cause is fully sufficient, in a great number of instances, to account for the disease. It may be added, that the practical Yorkshire breeders will not now breed from either horse or mare which has spontaneously become blind; and continued experience, the best teacher, has convinced them that, in their own words, 'bad eyes will run through the stock.'

† 'Chabert avait annoncé que l'usage des herbes vennes sur des prairies qui reçoivent des engrais, paraissait susceptible de faire naitre l'ophthalmie périodique. Les observations de Bouin et de Demoussy semblent vérifier cette proposition. Le premier a observé ce qui suit: une petite prairie dans le bocage de la Vendée reçoit continuellement les eaux et tous les égouts des rues de la petite ville de la Châtaigneraie, se sa fertilité est telle qu'elle offre constamment l'aspect d'une belle végétation toujours active et abondante; or il est bien reconnu que presque tous les chevaux qu'on abondante dans cette prairie sont attaqués de la ophthalmie périodique après deux ou trois mois au plus de l'usage qu'ils ont fait de l'herbe longue, abondante et tres aqueuse qu'elle fournit. Demoussy rapporte que les chevaux qui naissent en Espagne, dans les plaines fertiles de Séville et d'Anduxur, submergées par le Guadalquiver, sont de même fréquemment atteints de cette affection. Cela porterait à penser que certains engrais communiquent aux herbes qu'ils font croître des qualités prejudiciables aux animaux.'

Treatment.—It is not in general found difficult to remove the immediate attack; but from the specific nature of the disease, and the connexion it has with the constitution at large, as before insisted on, it proves extremely difficult to prevent the recurrence. Common farriers attempt its present removal, and usually go no further. More scientific practitioners mitigate the urgent symptoms, and then attempt to attack the cause through the medium of the constitution at large; though it must be owned, in general cases, their efforts are attended with no better success, from the difficulty of detecting the immediate nature of the constitutional cause. If general plethora be suspected, we can reduce that; close stables we can open; dry food we can change for carrots, &c. in winter, and for soiling in summer; and if our pastures are low and exposed, these we can alter. Such constitutional means are in our power; but the predisposition when in action, and particularly when hereditary, will probably beat us. Unless the horse be very weak, or much emaciated, the *treatment* should be commenced by general blood-letting; in cases of much emaciation, it should be confined to topical bleeding only. I would also recommend that the first bleeding be a full one, and very quickly followed by a second, if the first produces no abatement of the symptoms; for it is of the first consequence to arrest the disease at its outset. If it establishes itself, it will be found very difficult to dislodge it. The general bleeding may also, on some occasions, be repeated once or twice afterwards: but when there is no existing plethora, I have not found a frequent repetition of general bleeding advance the cure. Topical evacuation of the blood may be attempted under every state of the body, and may be continued as long as any *active* inflammation exists: but cases will often occur when no benefit appears to result from even this. It has been recommended to abstract blood by puncturing or dividing the temporal artery, as a more than usually effective remedy; but I have already been at some pains to point out the error of such recommendation, seeing this artery is not distributed to the eye, but is wholly assigned to muscles and skin. (See page 196.) Topical bleeding, however, intended to unload the vessels of the eye, can be effected from a small venous branch which enters the inner canthus of the eye; or when the injection almost approaches chemosis, it may be better done by a division of the distended vessels of the conjunctiva; which, even in mild cases, will be seen turgid and full of blood around what is called the white of the eye, as well as within the lids. It requires only moderate dexterity to do this; for if the horse be firmly twitched by the nose, and the eyelids elevated by one hand, with the other these vessels may be readily divided by means of a small scalpel, lancet, or very fine scissors. I have now and then scarified the inner surface of the eyelids in preference, and have sometimes thought I gained more benefit from it. Considerable amendment has also followed the use of setons placed as near the eye as possible. In some instances they have been passed through the under part of the conjunctive coat; but I believe no great advantage has resulted from this mode in preference to placing them in the integuments just below the eye: in some cases the irritation has done harm; and a great objection to setons here, is, that they leave a blemish; but when particularly wished, by the use of a very small seton-needle, this is rendered trifling. Rowels under the throat are, likewise, not at all liable to this objection, and, as being a much larger drain, probably act with more advantage. I have occasionally tried them with evident benefit; and as they are not likely to be rubbed out by the horse, so, in many cases, they are to be preferred. I have also blistered the cheeks with success; but much caution is requisite to prevent the blistering matter from being rubbed into the eye itself: it may, however, be done in the following manner:—Spread over a piece of stout but pliant leather, the size of the palm of the hand, a thick margin of cobbler's wax, an inch in breadth, which will leave a central part bare; over this place some stiff blister plaister, such as is used for human blisters, which is much firmer than that made by the veterinarian. Apply this, a little warmed, three inches below and behind the eye; afterwards carefully tie the head up by each side, when no danger can occur.

The *external applications* proper in these cases are next to be pointed out: previously to which, however, it must be remarked, that the inflammation present does not, in all instances, bear the same character, but in some is accompanied with a higher degree of irritability than in others. For in some cases mildly stimulating applications agree best, as vitriolic solutions; tincture of opium, sometimes the spirituous and sometimes the vinous, according as circumstances require a more active or a less active stimulant; æther diluted; brandy diluted; saline washes, &c.: but at other times, and that more frequently, weak solutions of the superacetate of lead are best borne, and relieve most. In cases of very high irritation, poultices may be applied. I have experienced benefit from scraped carrots or turnips, and in one instance the common houseleek also was applied beneficially in this way: the most common poultices, however, are the saturnine, which may be very properly and generally attempted, and, when borne, are very useful. But, owing to the irritability of the animal, it is too often found difficult to retain a poultice; in lieu of which fomentations of poppy heads and chamomile or mallow can be conveniently used: and in every case likewise an apparatus of folded linen, wetted with the Goulard water or other wash, may be kept on with ease. Soft linen cloth, several times doubled, may be used for this purpose, fastened to the headstall from the ear of the affected side, as far as the centre of the collar front, hanging from this down the middle of the face over the affected eye, and then secured across by tape. This will have the double advantage of shielding the eye from light, which is always desirable, and of keeping the medicaments constantly applied. The following recipe will be found a good one for the early states of the complaint; but, when the irritability is extreme, omit the vinegar[*]:—

No. 1.—	Superacetate (*sugar of lead*)	one drachm
	Rose water	four ounces
	Vinegar...	half an ounce
	Soft water..............	a pint.

Internal medicines ought next to occupy our attention. In every instance, if the horse be tolerably full of condition, debar him from corn; instead of which give bran mashes: and, if it can be procured, green meat instead of hay; if not, give carrots, which will support the condition without heating. Every thing that requires active chewing must necessarily force much blood to the head, and, therefore, should be avoided. Some practitioners prefer *diuretics* in these cases; some *purge*; and others trust principally to *alteratives*. I have usually prescribed one or two mild purgatives, and with apparent benefit; but active purgation is objected to by some practitioners: Mr. Coleman, I believe, did so. There can, however, be no doubt on the propriety of a soluble state of the bowels; neither can there be but one opinion on that of antimonial alteratives: as already hinted, there is very often present a constringed state of skin, and other feverish symptoms, to combat which warm clothing is advisable: and, as a farther assistant towards a determination to the surface, give calomel, tartarized antimony, and nitre, as a general alterative. With these means unite a pure air, and avoid every source of unhealthy irritation from dung, urine, or crowded stable. Exercise, for the first few days after an acute attack, had better be omitted; afterwards it may be allowed, but by walking only, and not then when the wind is high or the air cold. In a week or ten days, it may be expected that, *by these means*, the extreme irritation of the affection may have given way, when any of the following formulæ may be tried; for it may be remarked that, in three cases, all appearing alike, it is not uncommon, as observed below, to find each require a different application: different formulæ are therefore given:—

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[*] I remember to have been induced to try warm fomentations to one case, from its extreme obstinacy. The amendment was striking. I afterwards tried it on others with variable success The practitioner who meets with many of these cases, will have to remark on the very different degrees of benefit received from remedies applied to cases apparently similar. In some, that which was sanative in one proves noxious even in the next: it therefore behoves him to vary his mode of treatment, to meet, by repeated trials, that which best suits the case in hand.

No. 2.—	Superacetate (*sugar of lead*)	one drachm
	Sulphate of zinc (*white vitriol*)	two scruples
	Water	a pint.
No. 3.—	Muriate of ammonia (*crude sal ammoniac*)	two drachms
	Vinegar	two ounces
	Infusion of red rose leaves	a pint.
No. 4.—	Brandy	one ounce
	Vinegar	one ounce
	Tincture of opium	two drachms
	Rose water	eight ounces.
No. 5.—	Æther	half an ounce
	Infusion of oak bark	six ounces.
No. 6.—	Rose water	six ounces
	Mindererus's spirit (see *Mat. Med.*)	three ounces.

Introduce any of these, by means of a small piece of sponge or rag, within the inner angle of the eye, gently pressing in a little, which the action of the nictitating membrane, or haw, will soon carry over the surface. Various other applications have been used besides those enumerated; few of them with *permanent* benefit, but many with present advantage. Among them may be noticed an infusion of solanum nigrum, or garden nightshade, which, from its wonderful properties of apparently paralyzing the iris, was supposed capable of arresting the inflammatory action: but the event has not justified the expectation. Had it proved otherwise, it would have formed a most convenient application, as it will produce its effects by absorption without actual introduction to the eye; consequently an ointment rubbed on the temple would, in such case, have been sufficient. The cajeput oil has been also tried with some benefit. Gall, common salt, watery solutions of opium, of aloes, and of ground ivy also, have all of them had their advocates. There are other stimulants which remain to be mentioned as particularly applicable to the inactive chronic states of the disease I have noticed as one of its occasional forms.

The *mechanical means* used as remedies in this complaint have also been various. The removal of a part or of the whole of the haw has been practised under the most erroneous view of the matter: nevertheless the bleeding and irritation consequent to such an operation have proved somewhat beneficial, which has served to perpetuate the barbarism. Taking up the carotid artery on the affected side has also been tried, under an idea of lessening the arterial determination to the head. It has, however, failed in affording relief, and is altogether an ineligible practice. The temporal and angular arteries have been also taken up. Neither have the veins escaped, but several have been divided experimentally, and all with equal want of permanent success. The destruction of one eye has also been practised with lasting benefit to the remaining eye; and this in so many instances, that it in a degree blunts the natural repugnance to its apparent brutality and violence. The benefits resulting from it are founded on a law in the animal economy, that where organs are double, as the eyes, ears, &c., the loss of one is sure to throw additional strength into the other. In correspondence with this view, it had been long observed, that, after both eyes had been affected, if the disease became permanent in one, the other eye frequently recovered its remaining affection; it has therefore been a practice with some farriers to put out the worst of the two affected eyes, for the purpose of saving one. If this should ever become general, it is evident it can only be successful before any considerable disorganization has proceeded in the eye attempted to be saved. The operation may be performed by introducing a couching-needle within the globe, and by breaking down its texture to excite suppuration. Or, in preference, introduce a small, curved, and very sharp-pointed bistoury within the anterior chamber, at the margin of the cornea; then pass it into the pupil, and force the lens from the capsule: in retracting the bistoury, make a sufficient opening to allow of the escape of the lens by gentle pressure. Totally destroying all functional structure in the diseased eye, would appear to be all that is requisite to excite in the other the sympathy of necessity sufficient to ensure its future health[*].

To pursue the disease progressively it may be remarked, that consequences *follow* the active inflammatory attacks, which have occasioned practical attempts to combat them in particular. The principal of these is the opacity of the transparent cornea, in either the form of one or more specks; or otherwise of a general pervading film, for the removal of which mechanical friction has been very generally practised by means of rough substances, as powdered glass, powdered tutty, charcoal, &c. &c. But it should be remembered that this opacity is not confined to the outer surface of the cornea, but pervades its whole substance likewise; so that, when such applications do any good, it is not by mechanical abrasion, but by stimulating the absorbents to remove the coagulable lymph, which forms the obstructing matter. This being the case, other substances may be found more efficacious than those that are simply abrasive and rough. Calomel, acetate of lead, a mixture of chalk and powdered alum, or of white vitriol, calamine and tutty, may all be used for this purpose. These matters may be introduced by placing a little of the powder within the inner angle by the help of the fingers, leaving it to be carried over the eye by the action of the haw: but it is not prudent to blow in any powder by means of a quill, as is frequently done, for it alarms the horse, and is apt to make him shy about the head ever after. The red precipitate ointment, occasionally alternated with these every third or fourth day, and in very small quantity, has been beneficial. In protracted cases, when the disease has been thus far removed, I have recommended, as a matter of experiment, turning out to grass for a considerable time, and it has seemed as though the constitutional tendency has been removed by it; for it did not return so long as I knew the animals. In other cases it has again appeared; nor do I think turning out generally proper, so long as the slightest degree of inflammation lasts, although even here it has done good: in many other cases I have seen it hasten the fatal termination into cataract. When it has once occurred in young draught horses, from the increased tendency such work has to force blood to the head, I have always recommended that such horses be afterwards used only for the saddle, and this sometimes with apparent advantage. In some few cases, but which were probably not originally specific, but might have degenerated into it, the recurrence appeared to be prevented by permitting horses, which were otherwise constantly in use, to lie without doors every night, and I have my doubts whether this might not be often practised with more advantage than any other plan[†]. Mercurial courses, occasional physic, periodical bleedings, and

[*] As prejudices guide even those who affect to despise them, so the veterinary surgeon might hesitate to perform such an operation: the consequence of which would be, the horse would be taken to a farrier, who introduces possibly quick lime or corrosive mercury within the lids, and the eye is destroyed with inexpressible torture; or, at best, he punctures it with an awl, and the eye vacillates long before its destruction is complete. As the fact is now established, that the purposed disorganization of one frees the other from the diseased tendency, in a great many cases, the operation is justifiable, and even to be recommended. Mr. Castley observed that it is very common in Ireland, and that in Tipperary there is a person famed for this operation, whose practice in this way must be immense, for he was informed that he had performed it twenty-nine times in one week: if it were half that number, it would prove the faith in the operation and the prevalence of the disease.

[†] One of these cases was a very marked one. I was paying a visit to a medical friend in Buckinghamshire, who complained that one of his horses was frequently attacked with ophthalmia, which troubled him, and that he was seldom without a cold, in which his other horse participated as far as the catarrh. The stable this horse and his partner were confined in was very small, very snug, and exhibited much pains to keep it, I will not say warm, but hot. I recommended my friend, therefore,

often-repeated alteratives, have all been tried, but have too frequently failed. Nevertheless it is left to the discretionary judgment of the veterinarian to determine which means to adopt, seeing all have occasionally evinced some preventive efficacy.

CATARACT.

THE specific ophthalmia just described has too common a tendency to terminate in *cataract;* which as it never appears, as in the human, as a disease distinct and independent of the active inflammation of ophthalmia, so it can hardly be said to merit a separate place among the diseases of the horse. There is in the cataract of horses, independent of the opacity of the lens, generally much derangement of the other internal parts of the eye, particularly of the iris, which sometimes adheres to the lens, at others to the cornea, and in some cases its pupillary opening is so reduced by contraction as to render the cataract hardly perceptible. This internal derangement, therefore, greatly prevents any benefit being derived from the operation of *couching* or *extracting* in veterinary practice; add to which, a horse so operated on would be under the necessity, to reap any advantage from it, to wear glasses ever after. It has, however, been suggested that, even without glasses, so much benefit might be gained from it as to prevent accidents, as running against posts, falling into pits, &c. This, however, would be greatly overbalanced by the imperfect vision of other objects, and a horse so operated on would be sure to become very startlish. It has however been attempted, both after the manner of the human surgeon, and also by an opening made through the great orbitary fossa, by which it may be more readily steadied; but it has never yet succeeded among us sufficiently to justify its repetition. In addition to the difficulty of so steadying the eye that it can seldom be attempted without wounding the iris or the retina, the adhesions formed render much internal violence necessary to its extraction. Disorganization has also usually proceeded commonly beyond the lens and its capsule[*].

AMAUROSIS, OR GUTTA SERENA.

THIS disease, known among farriers by the term *glass eyes*, from the peculiar *glassy* appearance the eyes put on, is generally considered as dependent on a paralytic state of the optic nerves, or their nervous expansions, the retinæ; and the remedies that have been made use of with success in the human subject seem to justify this idea. By others it is, however, thought to arise from the effects of inflammation, by which coagulable lymph is placed over the optic nerve, thus rendering the retina inaccessible to the stimulus of light, and which may be an occasional but is certainly not the usual cause. Any irritation on the tubercula quadragemini, as a spiculi of bony excrescence, or pressure on them, which is liable to arise within the head, of whatever nature, may occasion it; thus it is found to follow the congestions of staggers and the effusions produced by it[†]. The veterinarian should make himself familiar with the appearance this

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not only to throw open his stable door day and night, but to barricade about ten yards square around the doors, and to allow the horses during the night to be in or out of the stable as they pleased. Not only did this put a stop to the ophthalmia, and rendered both but little obnoxious to catarrh afterwards, but it was observed, that on most future occasions, when his servant was called up to saddle a horse for him in the middle of the night, even when it was frosty, one, and usually both, were resting on the ground without the stable.

[*] Our enterprising neighbours, the French, have long practised both *couching* and *extraction:* in the Lyons school it has been very fully tried. A Mons. Valet, I was assured by Mons. Huzard, had performed both operations many times with much dexterity, by means of an instrument of great ingenuity and complexity, and which the curious inquirer will find described in Hurtrel d'Arboval, together with a full detail of the methods, consequences, and individuals who have advocated the operation. Interest may be derived from the perusal, but no stimulus to renew the attempt: in fact, I believe the operation is now entirely laid aside.

[†] It has lately been noticed among our neighbours, the French, where so many observations have been first made, that amaurosis frequently follows staggers. In the *Recueil de Met. Vet.* for June 1828, M. Berger Perriere published several cases of staggers of the kind we denominate stomachic, successfully treated, but which were most of them followed by amaurosis: one person

complaint puts on, otherwise he may lie open to serious imposition. In amaurosis, a horse presents indications of blindness in his *manner*, though but little in his *eyes;* he seems cautious in stepping, lifts his legs high, and moves his ears quickly, as though endeavouring to make up by sound the intelligence lost by the deprivation of sight: but, above all, a hand moved close to the eye occasions no winking, unless held close enough for the motion to influence the air around, which an artful person might manage with ease. When this kind of eye is examined closely, the pupil will be found of one *invariable size* and unvarying hue: it will not enlarge and diminish as in a healthy horse, when removed farther from, or nearer to, the light; for the retina, ceasing to be open to the luminous ray, no longer influences the contractions of the iris. It is, therefore, from the peculiarities in the manner of the horse, the invariable size of the pupil, and a *greenish glassy cast* in such eyes, that these cases may be distinguished. As it has hitherto proved incurable, we shall waste no time on its treatment.

FILARIA, OR WORM IN THE EYE.

THE existence of a species of *filaria* which penetrated the cavities of the body of the horse and his congeners, pervaded its cellular tissues, and even occasionally made its way into the eye, has been long known to those at all conversant in natural history*; but that its penetration of the eye was now become one of its settled habits in India, where it resolved itself into an established disease, was not so well known; and the first notices recorded were so vague and indefinite, that I deferred any mention of it until it assumed a less questionable shape. Through the medium of that excellent source of information, *The Veterinarian*, we are now more fully informed on the existence of this new proof of the extensive diffusion of parasitic animals over and within every part of the animal frame. It would appear, by notices in the French works, that the filaria is almost as common among oxen and cows in the provinces, as it is among the horses of India. No accounts of its infesting the ruminants of the last have, I believe, reached us. This parasite is supposed to be the *filaria papillosa*, and is described as nearly an inch in length; the body elongated and cylindrical; in size and colour corresponding with the finest white sewing thread, but with a semi-transparent lustre; attenuated at either extremity. Its presence is detected by its effects, which are that of a deep-seated ophthalmia, usually confined to one eye only. The conjunctive coat is highly inflamed, and turgid with red blood; the transparent cornea is obscured and cloudy: impatience of light, and closed eyelids, are also accompanying symptoms of the irritation. By attentive observation this minute filamentary worm is seen floating within the aqueous humour; and although its presence does not appear to occasion acute pain, yet, if it be suffered to remain many days, it is invariably fatal to the eye. Its *removal* is effected by puncturing the cornea in some part. Mr. Twining does it a little

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had, in the course of ten years, twelve horses affected with staggers: of which number eight had died, and of the four survivors three went blind of amaurosis. In some of the cases detailed the optic paralysis crept slowly on, and was not completed in less than nine months: in others vision was never wholly lost, but the connexion was fully established. M. Bouley and M. Girard, jun. relate similar cases.

* *Filaria equi*, habitat in equini corporis cavis variis, telaque cellulosa. *Lin. Syst. Nat.* Sir Everard Home, in his *Comparative Anatomy*, has observed that two species of worm, the strongylus armatus and filaria papillosa, are found alive in the aqueous humour of the horse in India. Mr. Wardrop, in his *Essay on the Diseases of the Eye of the Horse*, published in 1819, notices, that a worm in India is said to be generated within the eye, and the natives let it out by making an incision through the cornea. About the same time an account appeared in *The Transactions of the Philosophical Society of Philadelphia* 'of a living snake in a living horse's eye.' In the *Transactions of the Veterinary School of Lyons* for the year 1822-3, mention is made of two thread-like worms which were seen floating in the eye of a mule, which is all the notice I have met with of the presence of æquine filaria in Europe. Among oxen it must have been sufficiently common, since M. Chaignaud, V.S., informs us he has met with upwards of one hundred and fifty cases since the year 1805, which is singular: for that faithful and circumstantial herald of veterinary knowledge in France, Huitrel d'Arboval, although he notices the filaria as a variety of the intestinal worms which has been found in the stomach towards the pyloric extremity, where it congregates and forms tumours, yet makes no mention of it as infesting the eye of either horses or cattle; neither is it noticed in his long detail of the varieties of ophthalmia and its several causes among either the monodactyles or ruminants.

below the centre: by Mr. Molyneux and Mr. C. Percivall, it was done, with more apparent propriety, a line's breadth from the sclerotic margin. The horse is by some operators cast, and by others not. Mr. Percivall and Mr. Twining used a lancet for making the puncture. Mr. Molyneux prefers a very small trochar. As soon as the puncture is made, the worm usually escapes with the aqueous humour; and if it should not, the operation must be repeated the next or following day, by which time the eye will have filled again, and brought to view the worm also. A slow recovery follows the departure of the parasite; and the opacity occasioned by it is sometimes not wholly absorbed in less than six months. Observations on this singular attack on the eye have shewn that it is somehow connected with the *kumree*, a disease (see *Kumree)* which appears to be occasioned by inflammation of the tissues of the medulla spinalis, for the horses attacked with the filaria are very frequently objects of the kumree also. Is the disease propagated from the optic nerve, to the tubercula quadragemini, and along the base of the brain to the spinal rope? Or does it give one reason to suspect that the spinal canal is also the habitat of some verminous animal?

EXCRESCENCES, &c. ON THE EYES.

It remains to observe, that small polypous excrescences sometimes form on the globe of the eye, or on the eyelids. Fungoid projections on the transparent cornea likewise sometimes follow accidental abrasions, or may be spontaneous. When they are of the nature of polypi, cut them off, and touch the base with liq. plumb. acetat. in its undiluted state. When of the fungoid kind, the white vitriol in powder, or a minute quantity of the ung. precip. rub., softened with oil and painted over it every second or third day, will effect a removal.

CLASS XIX.

DISEASES OF THE SKIN.

GREASE.

THIS disease appears to be dependent on a morbid alteration in the quantity and quality of the sebaceous matter secreted by the subcutaneous glands of the extremities (see page 171). The inflammation which first brings about this effect exhibits some singularities and some *specialities* not observable in the inflammations of the sebaceous glands of other parts, which made me disposed to consider it as of a *specific* nature; and had the assertions of Jenner and others, that the matter produced by it was capable of raising a disease by inoculation which was again communicable, its character as a specific disease would stand on equal grounds with syphilis or small-pox. But that capability is now questionable, although not decidedly proved to be erroneous; and as on this it rests its main support to the character of a specific disease, the matter must be left as undecided. I have already remarked (p. 171) that the secretion of the sebaceous glands varies according to the *nature* and the necessities of the part furnishing it: it is ceruminous in the ears, semi-ceruminous in the glans penis, and unctuous on cuticular surfaces. It cannot be denied, therefore, as probable, that as the functional office of these glands varies with their locality, so their diseases may also exhibit corresponding peculiarities, which we find to be the case here[*]. Mr. Percivall notices in this disease its simple form, its ulcerative, and its grapy form. In the *simple* form there is merely swelling of the skin of the hind legs, which becomes hot, inflamed, and tumefied; greasy in appearance and offensive in smell. It also soon assumes an *ulcerative* character, and cracks, raw, deep, and excessively tender, mark the next stage of the affection. Unless the further progress of the disease can be arrested, these wide and deeply ulcerated cracks throw up loathsome excrescences called *grapes:* renewed serous deposits continue to be added, and the heels become enormously swollen.

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[*] Hurtrel d'Arboval appears to consider grease as more an affection of the hair than of the skin, 'L'affection dont il s'agit tient toujours, dans son principe, à une irritation locale bien manifeste, qui offre les caractères d'une inflammation aiguë, avec tendance à devenir chronique. Regardée à tort par quelques uns comme consistant dans le développement d'un très grand nombre d'ulcères atoniques, plus généralement considérée comme une maladie spéciale de la peau, n'est-elle pas plutôt le résultat d'une lésion particulière des bulbes des poils? Bien que par suite cette lesion

The inflammation productive of grease appears to originate in *debility*, general or local. It originates in general debility, when the system at large is debile from long-continued disease; or from want of proper nutriment; or from long continued exertion: in which cases these parts being farther removed from the source of circulation, which itself labours under *additional* languor, they must suffer proportionally in a greater degree than those more within the sphere of the action of the heart; and hence accumulation takes place, which, if not removed, terminates in an inflammation of the distended parts, and an increase of the secretions peculiar to the part. This species of general debility appears a natural occurrence in spring and autumn, and is present in most horses at those times, from the efforts employed to generate a new clothing of hair: it follows, therefore, under this view, that swelled legs ought to be prevalent then, which we know to be so.

Grease may be said to have local debility for its cause, when the powers of the system are not properly balanced, as when there is great general vigour, with perhaps increased action from plethora, and likewise little waste to the system by exercise. As fluids press, not in proportion to their diameter, but to the height of their column, the venous blood must find some difficulty to its ascent. This resistance, at all times considerable, is much increased by circumstances, as size, in a tall long-legged horse; it is also increased in plethoric horses kept without exercise, because, not receiving additional aids from the pressure of the surrounding parts, accumulation takes place, and in a greater degree, when the whole vascular system is in a state of distention: debility, therefore, is still more certain in those distended vessels remote from the influence of the heart, under all which circumstances the effects productive of grease necessarily ensue. The capillaries of the pasterns likewise become unequal to the exertion of pressing forward the column of blood into the veins, when, to their natural remoteness from the source of circulation, any additional cause is superadded, either of want of power in themselves, or of resistance in the veins. For it must not be supposed that by this mode of reasoning we mean to infer any *original defect* in the parts. Nature formed the balance of power equal, as she made the functions equal; but this balance is kept up in some parts by their own force, and in others by the aid of different powers. Animals being formed always for a life of nature, have no purposed structural specialities to accommodate them to a life of art, beyond their natural powers of bearing this change; hence, therefore, though the vessels, at this remove from the heart, must be supposed weaker in individual strength, yet, in a state of nature, they become equal from the support and assistance they derive from surrounding parts, more particularly from the pres-

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paraisse avoir un siège plus étendu, que même des points très nombreux et très rapprochés des tegumens se trouvent affectés, ce qui, au simple aspect, peut rendre difficile la découverte du véritable siege du mal, toujours faut-il tenir quelques compte de l'état pathologique despoils, et particulièrement de ce qu'on remarque à leur racine après leur évulsion. Or, si l'on prend la maladie à sa naissance, c'est-à-dire avant ce quon entend par son développement, avant tout engorgement, toute-chaleur, toute douléur locale, le premier phénomène qui frappe les yeux est le hérissement des poils. Les poils sont donc primitivement affectés. Si on les arrache après que la maladie a fait quelques progrés, ce qui d'ailleurs s'exécute sans une grande difficulté, on voit, surtout à l'aide d'une fort loupe ou du microscope, leur racine altérée, et assez souvent l'on amène avec eux une gouttelette d'un fluide séreux ou puriforme, signes du changement qui s'est opère dans le mode ordinaire de vitalité de ces petits corps filiformes, indices de l'irritation qu'on peut présumer s'être dévélloppée à leur origine. On ne saurait confondre cette matière avec celle qui nourrit le poil et concourt à se reproduction, pulsque cette dernière n'est pas sensible ni apercevable, lorsque, pour avoir un point de comparison, l'on arrache des poils su une surface saine. L'habitude trop générale où l'on est de n'étudier les maladies des animaux qu'au moment où elles sont parvennes à une certain période, fait trop souvent confondre les phénomènes symptomatiques avec les ,phénomènes essentiels c'est ainsi, peut-être, que, dans les eaux aux jambes, on considére comme pathognomoniques des désordie que les progrès de la maladie propagent à toutes les parties constituantes de la peau, et même aux parties contiguës.'

sure of the neighbouring muscles, tendons, ligaments, and integuments, during exercise; the venous trunks must derive much assistance from the superficial order likewise. By this pressure, during exercise, the cellular membrane also is itself pressed upon to resist accumulation; and, lastly, the absorbents by this means become stimulated to greater action to remove any deposit that may have been formed, and which is evident from the effect which takes place on swelled legs, by a few minutes' exercise. In a state of nature, the benefits of exercise are constantly in action, as well from the inherent love of play, as the search after food. This propensity is wisely given strongest in those in whom it is most necessary; in the young to enforce the circulation, that the vessels may be stimulated to their deposit for the growth of parts; and in the lusty and plethoric, that the absorbents may be kept in equal action with the secreting vessels: we, therefore, see such several times in the day race round a field with all the frolicksome sport of children. In the debile and the old, in whom the absorption is equal, and often greater than the deposit, this would be unnecessary, and they are not equally stimulated by a love of play (See the subject, *Exercise.)* The horse is, therefore, an animal intended by nature for exertion; and, whenever we deprive him of *exercise*, we prevent the proper balance of power being kept up between different parts of the frame; and if to his confinement a generous diet be added, swelled legs so generally follow: and for the same reason it is that within twenty-four hours horses taken up from grass or a straw-yard begin to shew the effects of cellular distention in their legs.

Over-feeding is one of the causes of grease, for from the superabundance a larger quantity of blood is formed, and consequent vascular distention; and if to this plethoric state the want of exercise be added, the legs will be the parts most likely to suffer from the reasons before given. An inflammatory re-action will follow the distention, and the sebaceous glands will be stimulated both to an increased and an unhealthy deposit: and they being here very numerous and large, and being required to secrete in proportion, it follows that instead of the natural unctuous secretion of the skin of the heels, they will now pour forth a serous effusion in the form of *cracks*, or a general purulent one under the character of *grease*. A local stimulus is equally an after parent of debility, and therefore encourages grease; from which cause it is, that it so frequently follows blistering; for if a horse be incautiously blistered in the hinder legs in the winter, grease is almost sure to follow. Cold and moisture are likewise circumstances favourable to the generating of this disease. Cold is unfavourable to absorption; it likewise weakens the general energy of the parts, and it often suspends the circulation; and, when this has happened, on the return of warmth the circulation for a time is always preternaturally increased, and the distended vessels, being previously weakened, are rendered incapable of contracting on their contents; and it is perhaps principally to the presence of cold, and its effects on the constitution, that swelled legs, cracks, and grease, are so much more common in winter. Grease has even been called a winter disease and the *chilblain* of horses[*]. Moisture is likewise favourable to the complaint, for it first produces a determination to the parts, and then, as a parent of cold, it weakens the already distended vessels. I was informed by an officer of a dragoon regiment, that, when stationed in America, one other officer being favourable to the custom of washing the heels of horses, was permitted to exercise it on his own troop; the result was, that this individual troop in three months furnished more than twenty greased horses, and the remainder of the regiment not more than two or three. It is, however, probable that there is nothing immediately detrimental in the simple washing; the evil arises from the legs being permitted to dry without friction, by which means evaporation generates cold, and moisture is favourable to distention. It is seldom, likewise, when there is much hair, that the dirt can be effectually removed from the legs; indeed it is too apt to be altogether neglected in such horses: and it is most erroneous to suppose that the hair prevents the access of dirt, when it is in constant motion, and continually receiving new supplies at every step; much less can hair guard the legs from moisture. Hair at the heels most certainly retains moisture. It may possibly prevent the access of dirt in a trifling degree; but I think it is evident that it does not prevent the access of moisture, by nature having supplied the surface itself with a defence of another kind from the secreted matter: on the contrary, it retains it, as may be readily seen when they get once well soaked. Reasoning from analogy, from the resistance which feathers give to wet, is fanciful, but erroneous: feathers are supplied with a specific apparatus for the purpose of keeping them dry. The hair appears in a natural state to answer two wise purposes; it keeps the heels warm, it likewise prevents injury from wood and stones, with which, in a state of nature, most parts of the earth are covered: that this is true appears from what we observe in blood horses, who, as being natives of a sandy hot soil, require no defence either from cold or from stones, and hence have no long hair on their fetlocks. That it is even with us a defence from the cold cannot be denied; and provided horses were always at grass, it would be well to retain it. Among stabled horses it is in this way useless; and as it usually prevents due hand-rubbing, it is worse than useless. As a defence, except to farmers' horses at plough, or to foresters' horses, it is unnecessary, for our fields are smooth, and our roads are levelled. The *acclivity* of the *stalls* in our stables has been considered as aiding the other causes of grease, and with some apparent propriety; for it tends to throw considerable weight on the hinder extremities, and, by the unnatural position of the heels, puts the parts on the stretch, and hence weakens them. Grease will often follow injuries; as halter casting, or indeed any accidental abrasion, may bring it on. The disease may become serious when it occurs under other circumstances favourable to its production, as in moist, cold, and particularly frosty or snowy weather; or when, from previous illness, a horse has been thrown out of condition; and, more than all, when such a case has been neglected by the idleness or ignorance of those around, who, finding a swelled heel, immediately fly to urine balls, or purging balls, whereas a little local attention would heal the abraded surfaces at once. Vast numbers of horses are greased by want of attention: it is too much to say, that, under good grooming, horses would never have swelled or even cracked heels, but perhaps few, if any, would ever run into that stage of ulceration, distinguished from milder abrasions by the term grease, as expressive of its oily discharge. It is to extreme cleanliness, to free ventilation, hand-rubbing of the legs when wet until they are perfectly dry, and to immediate local attention to any accidental abrasion, or to any slight swelling of the heels, that grease is now banished from among our cavalry, and so seldom met with in any well-regulated stable. The states that lead to it may be, and often are, idiopathic; but grease itself is, in ninety-nine cases out of a hundred, the consequence of improper treatment of some kind. Grease rarely attacks the fore legs, for which there are natural and accidental reasons; the hind legs are farther removed from the source of circulation, and have further to press forwards their accumulated fluids: they have also more cellular substance about them, particularly in the large coarse breeds; are more exposed to cold air in the stable, and more particularly to the ill effects of urinary splashings, as well as the exhalations from dung and wet litter: they likewise too often miss much of that attention paid to the fore legs. The attendant is apt to slight them, because the stable is less clean from soil and moisture; from fear also the hinder extremities get neglected, as many grooms dare not trust themselves on their knees, or even employ both hands at once to the hinder extremities; and I need not say, that, from one hand being a resisting point to the other, sufficient friction cannot be obtained without: this neglect the hind legs feel, and certainly suffer from. Thick fleshy-legged horses are the most liable to grease, therefore it is principally found among cart and heavy coach horses; but as coach-work is now almost entirely conducted with horses having some mixture of what is termed blood, in whom the cellular membrane is in smaller quantities, it is little known in the stables of the coach-master, and the same holds good with regard to the cavalry. Colour, likewise, as it marks debility, so it influences grease; that is, it has been remarked that white-legged and light-coloured horses generally are more liable to cracks, to grease, and to diseases of the feet, than others which are darker, and such whose legs are black.

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[*] It was well said by the late Professor Peal, that it was a *winter* disease; but I think he was less happy in comparing it to *chilblain*, which is a simple congestion of the cellular tissues, that in its worst form produces an unhealthy ulcer, simply because it wants life. Grease produces an ulcer totally different in original cause, situation, and procedure; it is possessed of too much life, and is the parent of a secretion of a distinct kind. The ulcer of chilblain always erodes inwards; the ulcer of grease extends outwards, and increases the dimensions of the parts it occupies. Before ulceration, tumid skin, the intolerable itching, and the evening exacerbations of fever of chilblain, meet no *analogue* in the simply swelled leg of the horse previously to its rupture into crack.

The Treatment of Grease.

This complaint takes on different states or stages, which being known by different terms, as swelled legs, cracks, grease, graped heels, &c., are apt to be considered as distinct diseases: but the causes producing any one of them may produce the other, and the treatment of all must be grounded on the same principles: nevertheless, for simplicity of reference we shall consider these several states separately, still blending the character of the specific affection and the treatment. Swelled legs without discharge have been already fully considered with dropsical swellings. See Class VIII. See also *Condition.*

Of *Cracks.*—As a consequence of general plethora, the capillaries of the heels are subject to distention and consequent inflammation. This state is frequently the consequence of a sudden change in the habit of life, and therefore frequently shews itself in young horses, which have been at once removed without due caution from grass or straw to hot stables and corn. At first there will be simply heat and itching in the part; the horse will be observed to rub one leg against the other, and sometimes to stamp with his foot, the whole surface appearing more red than before, but perhaps without much *enlargement*[*]. If this state be not attended to, there succeeds an oozing out of the serous discharge from a kind of crack, of which there are sometimes several. Occasionally the suppurative state follows so closely on the adhesive inflammation, that purulent matter appears to flow from them from the first; but, if suffered to proceed, pus always makes its appearance first or last. In this early state of tumid, itching, scurfy heels, frequently little more is necessary than a saturnine wash, having first well cleansed them with soap and water, and well dried them afterwards, removing as much of the cuticular eruption as possible. When the case has proceeded to form cracks, it will be advisable to attempt the stoppage of the discharge by some desiccative powder, as white lead and tutty in equal quantities. If with an inflammatory state there is an ichorous discharge, the saturnine ointment is to be preferred, avoiding still wet applications; but when an ulcerative process is fully established, the cracks shewing much virulence and tenderness, then something more is necessary; as a moderate bleeding, with alteratives, and a nightly bran mash; or even one or two doses of physic may be prudent, if the horse should be of a very gross habit. The cracks themselves must be carefully washed with warm water, whenever the horse returns from exercise; after which, bathe with any mild astringent lotion, as the following:—

No. 1.—	Superacetate (*sugar of lead*)	two drachms
	Sulphate of zinc (*white vitriol*)	one drachm
	Infusion of oak bark..............................	a pint.

Mix.

No. 2.—	Subacetate of copper	two drachms
	Elder ointment......................	six drachms

Honey sufficient to make it to the consistence of a firm ointment, which should be applied every morning and evening, by thinly spreading it over the sore surface.

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[*] This stage of grease is the only one that bears any resemblance to human *chilblain*; and this merely from suffering from the irritation of itching. Mange is rather general than local, and is brought about by removing horses at any time of the year, but principally during the spring and fall, from being subjected to an in-door life of warmth and clothing. *Chilblain*, on the contrary, is purely local, is a winter complaint, and follows from the inclemencies of out-door exposure, instead of a removal from them.

Sometimes the irritability of the parts requires the application of a poultice previously to the use of the astringent, as of Goulard and bran. I have found scraped carrots or turnips very useful for the purpose; after which the astringent will act with better effect. These cases sometimes prove very obstinate, particularly when they occur in young and rather coarse horses, and have been brought on by sudden changes of stabling, feeding, &c.; and I have occasionally found that nothing would effect a cure, or prevent the case from ending in confirmed grease, but turning to grass.

Swelled Legs, with Discharge.—In some instances with a general want of condition, the result of chronic disease, inanition, or of convalescence from acute diseases, there is a great tumefaction of all the extremities, which is apt to be followed by serous discharge from several outlets. The curative plan in this case differs from the former, and is more complicated; for we have to combat the general debility by generous diet in the form of speared corn, malt mashes, with soiling in summer, and carrots, &c. in winter. We must also endeavour to lessen the watery deposit by very mild diuretics, by remedies determining the serous parts of the blood towards the skin in the form of perspiration, and sometimes also by mild purges; but the former are more immediately advisable in general debility; because in these cases, particularly by mild diuretics, the watery parts of the blood are, as it were, simply separated: whereas, purging appears to be more the increase of a secretion, that answers some necessary purpose in the system; and, as such, the operation calls more of the powers of the constitution forth, without any additional advantage. This appears the proper mode of considering this circumstance generally; but I must not forbear to mention, that I have now and then, even in cases of emaciation, witnessed the good effect of one or two mild doses of physic; by which the discharge has mended, the horse's carcass has become let down, and other signs of improved condition have appeared. It was before hinted that cases occur of discharge from the heels, where astringents, immediately applied, only irritate: every practitioner must have met with such instances, as they are sufficiently common; the cause of which is attributed by farriers to *humours*. Without cavilling about the term, we know that in this form of the complaint such an irritative state of the parts is not an unfrequent attendant, and that it must be soothed and allayed before the parts will suffer themselves to be even gently stimulated by the mildest astringent applications. In these cases the heels, in addition to the tumefaction, and the pouring out of ichorous or semi-purulent discharge in considerable quantities, are stiff, tender, and painful in the extreme; the horse evinces the greatest reluctance to have any thing done to them, and when he is moved snatches up his leg convulsively, while the extent of vascular action is such that the heels smoke when exposed. This highly irritable state of the vessels can only be reduced by poultices. Sometimes it requires those of linseed, at others it most readily yields to those made with bran, and wetted with Goulard water; while some again are most benefitted by those made of scraped carrots; others by mashed turnips, previously boiled (see *Poultices, Mat. Med.*). By these means the heat, tenderness, swelling, and redness, will abate: the discharge also from a thin ichorous one will become white, bland, and truly purulent. At the same time, likewise, that the poultices are producing this effect on the discharge, the general determination to diseased action should be counteracted by alteratives. The following unites the necessary properties:—

No. 2.—	Oxymuriate of quicksilver (*corrosive sublimate*)...	ten grains
	Supertartrate of potash (*cream of tartar*)	three drachms
	Nitrate of potash (*nitre*)	ditto
	Prepared antimony	ditto.

Give this every night in a mash, except the complaint take place in a very emaciated horse; when, instead of the oxymuriate of quicksilver, substitute the same quantity of arsenic. On the contrary, if the patient be of a very full plethoric habit, add one or two drachms of powdered aloes to the diuretic, making the whole into a ball instead of a powder; watching, however, the action of the aloes, that it does not proceed to active purging or griping. In some cases, when the expense has not been an object, I have found the following an excellent alterative in cases of grease:—

No. 3.—	Sulphuretted quicksilver (*Æthiops mineral*)	half an ounce
	Supertartrate of potash	one ounce.

Give every night in a mash. In these cases, also, one or two doses of mild physic are often useful; and when the parts have been brought into a proper state for the action of astringent applications, wash with No. 1; or, instead, either of the following may be sprinkled over the sores:—

No. 4.—	Powdered oak bark	one ounce
	Subacetate of copper (*powdered verdigris*)	two drachms.

Or,

No. 5.—	Alum, finely powdered	one drachm
	Charcoal, ditto	half an ounce
	Chalk, ditto	two ounces

No. 6.—	Subacetate of copper (*verdigris*)	half an ounce
	Prepared calamine	one ounce
	Tar	four ounces.

Mix, and smear the parts lightly night and morning, and after each exercising, having first washed them with warm water. When, also, much tumefaction takes place, united to the use of any of these, a linen bandage is often beneficial; beginning at the coronet, and rolling it more than half way up the leg, being careful that it is only done with a very moderate degree of tightness at first. As amendment proceeds, great care is requisite to prevent relapse, by avoiding the original exciting causes, and likewise by counteracting that predisposition to these accumulations, which I have known to subsist in many horses, who seldom pass over a season without an attack. Such had better not, at any time, be *fully turned to grass*, but allowed only a few hours' run during the day. The general disposition to swelling will be best counteracted by long-continued walking exercise, with moderate feeding, particularly by the use of green meat in summer, and of carrots in winter, avoiding much corn, but, in lieu, allowing a sufficient quantity of less heating food, as those kinds already particularised. Bran mashes, as tending to open the body, should not be lost sight of; and when it can be conveniently managed, place the horse in a loose box. But when the complaint occurs in one already emaciated, or debile from any other cause whatever, of course the plan already detailed should be pursued with more moderate exercise, or with such as a loose box will afford. I have, in all these cases, where green meat could not be got, experienced great benefit from spearing the corn, particularly for such as were very low in their flesh and condition. (See *Materia Medica.*) Any *change* of food, almost, is proper; at least, any not manifestly injudicious. I once observed the best effects follow the substituting of beans for oats, and this in a horse not particularly emaciated; but I had previously remarked, that oats passed away unchanged, which *ground* beans did not do. Before we quit the subject it may not be improper again to remark, that this species of grease is frequently the result of blisters injudiciously applied when the legs are in a state of swelling and debility; and it may be offered as a caution to the junior practitioner, that he never attempts a blister, particularly of the hind legs, under such circumstances. For, towards the close of the year, or during winter, or whenever there is a previous determination towards the heels, if blisters are applied without considerable precautions and subsequent care, it will be hardly possible to prevent the legs, particularly the hinder, from becoming greasy immediately afterwards.

Confirmed Grease.—This is to be considered only as a more aggravated stage or state of the former; in which the matter that issues has a fœtid peculiar smell, which strongly characterises the disease; so much so, that a person used to it can at once tell whether a greasy horse be in a stable or not. The inflammation, that was before principally confined to the secreting capillaries and sebaceous glandular structure, now affects the integuments generally, producing extensive ulceration, with intermediate dry hardened scabs: the hair stands erect; the whole surface becomes exquisitely sensible and vascular, bleeding on the slightest touch; and the vessels of the heels not only secrete a peculiar matter, but some of them take on a peculiar action, and form a semi-corneous substance; so that, in the advanced stages and violent degrees of this complaint, hardened horny knobs form over the fetlock, intermixed with others more vascular, uniting the properties of pus, mucus, and oil: these protuberant portions are called *grapes*, from their figure. The constitution usually sympathises much with this extreme state of grease, and the horse, unless very well fed, becomes weak, lean, and irritable.

Treatment.—It becomes a question, whether, in a case of confirmed grease, even if it were in our power, it would be prudent to stop the discharge at once; for when secreting vessels have been long habituated to any action, they can seldom be suddenly checked with impunity; and in this case also, were the running stopped without previous preparation for the change, it is more than probable that some morbid effects would arise. To commence the *cure*, therefore, of confirmed grease, we must prepare some other parts to take on this action of forming pus. But it is to be first remembered, that the discharge from grease is seldom a healthy one, and it is hence much more difficult to check than one that is simply purulent; therefore, while some other parts are preparing to receive this purulent action, the heels themselves should be subjected to a treatment that may produce a more healthy secretion in them. The best means I have ever witnessed for effecting this, has been a fermenting poultice, made with either barley meal, flour, oatmeal, linseed, or any other farinaceous matter capable of fermenting with yeast. This should be applied every day, as soon as mixed, and suffered to perform all its fermentative process on the leg; when, by the action of the carbonic acid gas, or fixed air let loose, it is remarkable what a change is performed on the part, bringing on, from the most ichorous discharge and irritable state, a mild, bland, pus-like fluid, with a decrease of irritability. (See the formulæ for these under *Poultices*, *Mat. Med.)* Should either the trouble or expense of these be objected to, a carrot or turnip poultice may be tried instead, either of which may be applied till it produces a secretion of healthy matter; but it must be remembered, previously to the use of these means, that no ulcer shews a favourable disposition to heal so long as its surface remains above the level of the surrounding healthy parts; therefore it is essentially necessary to the cure, that these sprouting luxurious portions should be reduced even with the surrounding integuments. Caustics only render these *grapes*, as they are termed, more luxurious; but the mode best adapted to their removal is, to scrape off all the horny deposit, and thus level the surface with a very blunt knife; having a flat surface of heated iron also ready to pass over the surfaces, in case the hæmorrhages are profuse. It is also to be remarked, that, from the effects which have followed this intended *styptic*, there is reason to suppose that it acts also *remedially;* and that in all cases it should be united with the means used to denude the parts of the horny secretion and to level the surfaces. The operations being finished, apply the poultice as directed. To prepare the other parts to take on the formation of matter; on the first day of applying the poultice, if the horse be large and tolerably strong, put a rowel in the belly, and introduce a seton on the inner side of each thigh; or place two rowels only, one in each thigh. If the horse be either small or weak, one rowel will be sufficient. In three days the maturating of the rowel and setons will probably be complete; and in this time, by the above means, the heels will have taken on a more healthy action: it is now, therefore, that we are to attempt the stoppage of the discharge, which can only be done by the use of the most active of those applications termed astringents, which will stimulate the parts to take on the adhesive inflammation. For this purpose either of the following may be tried as a wash, to be used daily, or every other or every third day, or as often as the irritability of the parts will permit: some cases may require either of these applications strengthened, others weaker than here detailed: try, however, the weaker first:—

No. 7.—Nitric acid *(aquafortis)*	one ounce
Water	eight ounces.

Mix.

No. 8.—Sulphuric acid (*oil of vitriol)*	one ounce
Water	ten ounces.

Mix.

No. 9[*].—Oxymuriate of quicksilver *(corrosive sublimate)*	three drachms
Spirit of wine, or brandy	one ounce
Soft water	ten ounces.

Dissolve the mercury in the spirit by the help of a mortar, then add the water.

No. 10.—Subacetate of copper (*verdigris*)	half an ounce
Sulphate of alum (*alum*)	ditto
Sulphate of zinc (*white vitriol*)	ditto
Superacetate of lead (*sugar of lead*)	ditto
Tar	six ounces.

Mix.

This may be smeared over the parts daily, and will seldom occasion so much irritation as the former; but it is essential to the cure that a considerable inflammation should be raised, the necessary degree of which must depend on the state of the case and temperament of the patient. The *clivers*, or *goose grass*, has been likewise extolled as a remedy for bad grease cases: four ounces of the expressed juice are directed to be given daily, as a drink, and a poultice of the herb, mashed, is to be applied to the heels. When the discharge has ceased, it will sometimes be found that coagulable lymph has been thrown out, by which a hardened, thickened state of the limb remains: blisters may, in this case, be first tried, to promote the removal, assisted by a run at grass; but should these, as is sometimes the case, fail, the stimulus of firing should be tried. It must likewise be remembered, that as this complaint is very liable to recur again, from the parts having taken on the habit, and from the secreting surface being enlarged, so the recurrence is also best prevented by firing, which lessens the surface, and affords strength by corrugation. When this is not employed, active pressure by linen bandaging may be worthy of a trial. Nothing has hitherto been said on internal medicines, nor on other parts of the treatment as regards food, or exercise; in fact, it will at once strike the judicious reader, that exactly the same rules and the same cautions will apply here as have been detailed when treating on the other states and stages of this complaint. The constitutional tendency to disease must be equally amended by the internal remedies there laid down.

MALLENDERS AND SALLENDERS.

WHEN a disease appears in the follicular openings on the integuments, exhibiting a scurfy or scabby eruption at the posterior part of the bending of the knee, it is termed *mallenders:* and when a similar one appears at the ply, or bending of the hock in front, it is called *sallenders.* Neither of them lame or do much harm; but sometimes, when neglected, they degenerate into a more ichorous discharge, a little more troublesome, and always unsightly. Both of them are very easily removed by washing with soap and water, and by applying the following:—

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[*] Mr. White relates two remarkable cases of confirmed and virulent grease, cured by the application of corrosive sublimate in the form of a wash, when other means had failed. I have also often seen it beneficial. The strength of the application should be increased to the full amount that the animal can bear: but as the principle on which it acts is that of a more slow escharotic, it is a question whether the actual cautery is not to be preferred. I find among my notes the subjoined recipe, without any notice but the following:—'said to be a good remedy for grease. Citrine oint. 3 oz.; lard, 2 oz.; oil of turpentine, 2 drachms; saturated solution of nitrate of copper, 2 drachms. To be well blended in a glass mortar.'

Camphor	one drachm
Subacetate of lead (*sugar of lead*)	half a drachm
Mercurial ointment	one ounce.

Mix.

WARTS

ARE best removed by tying a ligature round them; or they may be cut off with a knife or scissors, and the root touched with any caustic body. There is sometimes seen a sprouting luxurious species, whose roots are larger than their heads, so that a ligature is not easily passed around them; these are best removed by touching their surface daily with what is by farriers called butter of antimony. In the older books of farriery they are called *anbury* or *ambury*; and many celebrated recipes for their removal are handed down from one sapient operator to another. The following application will seldom fail to remove such as cannot be conveniently got at by the knife or ligature, dressing with it once a-day:—

Muriate of ammonia (*sal ammoniac*)	two drachms
Powdered savin	one ounce
Lard	one ounce and a half.

MANGE.

THIS is sufficiently known as an eruptive affection of the skin, very highly contagious, and accompanied with almost incessant pruritus or itching. It is found in all our domestic quadrupeds, and extends also to the congenerous tribes which run wild around us: thus it is no uncommon thing to hunt a mangy fox in England, or a mangy wolf in Germany. In the various animals it affects, it presents some distinctive lines; but it possesses one common psoric character, for the mange of one can be communicated to the whole. We ourselves also partake of the common susceptibility, for I have witnessed several cases where the itch has been taken from mangy horses. The constant presence of animalculi within the pustules has again revived the opinion with some English and many French writers, that all psoric affections originate in the attack of acari*. Our principal difficulty is, to account for the readiness with which mange is taken and propagated, whether the animal be healthy or unhealthy, provided he is within the sphere of contagion; whereas there is great difference between the healthy and unhealthy, when contagion is not present. For among the truly healthy, as far as my experience goes, it never arises spontaneously; but it does most readily find a spontaneous origin in the *unhealthy*†. My first practical remar[illegible]all be, to warn the junior practitioner that he may sometimes mistake some cutaneous affections for mange which are referrible to derangements of the alimentary canal, and to those only (see *Surfeit* and *Condition).* He may also occasionally not be aware of the existence of true mange itself, from the nature of its approach, and its slow progress in some cases; but attention to the following detail may help him*. Mange often commences at the roots of the hair of the mane and tail, where a scurfy state of the skin appears, and which it gives the horse pleasure to have examined, and which alone is always a suspicious symptom. A few days will extend this beyond the simple line of the mane and tail: spots denuded of hair will appear, and such will eventually be seen to be making their way over the face. A close examination will detect under the branny scurf small vesicular eminences, watery above and red beneath; distinct in the moderate state, but confluent and running into continuous scabby patches in the inveterate. Mr. Percivall has, with his characteristic accuracy, remarked on the stubborn adherence of some few hairs in the very middle of the otherwise bare mangy patches. If the observer is inclined to examine these individual hairs, he will find that it requires a very powerful pull with a pair of tweezers to dislodge one of them from its cell within the cutis vera; and when done, he will find not only that the hair itself is enlarged, but that its bulb is singularly tumid and vascular. As the disease advances, it thickens and puckers the skin, particularly that of the neck, withers, and loins; and it is throughout marked by its incessant and intolerable irritation, which forces the horse often to rub himself raw. Too much cannot be urged with regard to its contagious qualities: the slightest contact will disseminate it; a hand laid on a mangy horse will inoculate a healthy one; the harness, the appointments of every kind, are the media of propagating the disease; in fact, every thing around the *infected* becomes *infected* also, and must be *disinfected* by washings or fumigations (see *Disinfectors*, *Mat. Med.*), to prevent its spreading.

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* 'Aujourd-hui, les uns admettent un vice psorique, sans dire en quoi il consiste; les autres considérent le développement de la gale comme dû à des animalcules nommes *mites* ou *acares;* d'autres encore adoptent un sentiment mixte, et disent que cette phlegmasie cutanée est tantôt *par acare* et tantôt *organique*. Si l'on s'en tient aux travaux de Bosc, Huzard, Latreille, Geoffroy de Saint-Hilaire, Duméril, Walz et Saint-Didier, il n'est plus permis de douter de la présence des animalcules dont il s'agit; il résulte des observations de ces naturalistes: 1, qu'en enlevant avec une brosse ou autre chose les croûtes ou plutôt l'espèce de poussière écailleuse que fournissent les pustules en se dessèchant, et examinant attentivement cette poussière au soleil ou dans un endroit chaud, on distingue, même à l'œil nu, ce qui nous parait bien difficile, des petits corps organisés, transparens, luisans, qui se meuvent avec assez de vitesse, et qui ne sont autre chose que les acares, insecte de la même famille que le *sarcopte* de la gale de l'homme; 3, qu'on-remarque presque toujours çà et là, dans l'épaisseur de la peau, des larves de ces animalcules en plus ou moins grande quantité; 3, que dans le cheval l'acare est si gros qu'on observe facilement sans le secours d'aucun verre lenticulaire, voyageant en quelque sorte sur les différentes parties du corps des chevaux Galeux. Au rapport de Gohier, les acres ont été observés, dans le cas de gale, sur le cheval, le chien, le chat, le lapin, et plus tard sur le bœuf; Walz les avait auparavant signalés sur le mouton.'

† By unhealthy, I would here include every cause that is found generally productive of a diseased state, local or general. In this way want of ventilation, want of personal cleanliness, and the accumulation of filth on and around the person, beget glandular affections within and eruptive affections without, most notoriously among ourselves; and if we allow the attack of parasitic

The cure of mange.—The disease is more often to be considered as a local affection; but there are cases also where it may have a constitutional connexion; as when brought on by emaciation, close confinement, and personal filth. When it occurs from contagion, in a full plethoric horse, it will expedite the cure to bleed. In cases either generated or caught, where emaciation is present, feed liberally with malt mashes and green food of the most nutritive kind. If in winter, allow carrots, beet, potatoes, &c.; and if these are not to be had, *spear*

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animals as the cause of psoric, herpetic, and other cutaneous affections here, the accumulating filth found where crowds congregate in utter neglect of cleanliness, personal or domestic, readily offers a nidus for the more industrious insect, ever on the look-out for a suitable habitation. This equally applies to our animals as to ourselves: the costermonger's wretched pony, that makes his way down some blind entry in St. Giles's, participates in his master's filth and his psora. A certain number of cows are kept in the purlieus of every town on the refuse of gardens and the scanty browsings of the highways; these at night are driven to occupy a standing or lying of a few feet each for the night in a place cleansed out only when the animals can no longer surmount the mass of filth. It is notorious that these cows are invariably mangy, with a constitutional denudation of hair, and a scaly eruptive state of skin. Were these even worse fed but better ventilated, and allowed sufficient space in their nightly lodging, and were they regularly rubbed as in Germany, cutaneous disease would be here, as there, a stranger; at least it is so in the well-regulated étable à vache. And yet one of our most respectable authorities is disinclined to allow that mange is at all derived from *personal filth*. It is equally contended not to be parented by *debility*, but to be greatly connected with *poverty*, by which I presume is intended *emaciation*; and that term would certainly include the principal source of debility as a parent of contagious mange. Cutaneous affections, resulting from injudicious feeding, which derange the digestive functions, are, as already observed, sufficiently common.

* That cutaneous affection known under the term surfeit so much resembles mild mange in its external characters, as to be very likely mistaken for it. Occasionally it is attended with much itching, and the hair falls off in patches; but the tumours are larger and solid, they are also seldom if ever vesicular; neither is the infection contagious, although it has appeared episootic in some seasons. It is very common to horses in the spring and fall particularly, and may be at any other time brought on by particular feeding, either within or without doors, or by any unusual exertion also, when united with suddenly suppressed perspiration. There is likewise another cutaneous morbid state, apparently derived from plethora only, in which there is much proritus or itching, without any apparent lesion of the skin whatever, or other disturbance of hair, than what is derived from frequent rubbing of the parts. We may suppose this to be some excitement of the sebaceous glands, and that therefore where these are most plentifully distributed, as in the neighbourhood of the mane and tail, the itching, as a pathognomonic symptom of the complaint, would be most observed, which is the case. But these states require to be treated constitutionally; the mange does not *essentially* require to be so treated, although in every case constitutional treatment expedites the cure.

the corn, and give with bran: for, although not generally [illegible]n into the account, a change of food, and here to overcome the debility, will materially assist and expedite the cure. Give also alteratives, as the following:—

No. 1.—	Oxymuriate of quicksilver (*corrosive sublimate*)	ten grains
	Nitrate of potash (*nitre*)	four drachms
	Supertartrate of potash (*cream of tartar*)	four drachms.

Or,

No. 2.—	Sulphuretted mercury (*Æthiop's mineral*)	half an ounce
	Supertartrate of potash (*cream of tartar*)	one ounce.

Either of these may be given in a mash every night, observing, at the same time, in case mercurials are used outwardly also, to watch the mouth. The *external applications* resorted to for the cure are various, and as there are many fancies in these cases, I introduce various recipes; but *sulphur* is, of all other remedies uncombined, the article most to be relied on. I have used all the following formulæ, and can recommend every one of them. The first three are *washes*, and are calculated for very mild cases, and where the filth of rubbing with unguents is wished to be avoided; but they should be abandoned if they do not benefit in a week. They may be applied with a sponge, carefully wetting every affected part. The two latter are *ointments*, sufficiently efficacious, particularly No. 4; but of course are not so cleanly as the former: these are also to be applied every morning, accurately rubbing all affected places.

No. 1.—	White hellebore	two ounces
	Tobacco	two ounces
	Lime water, strong and fresh made	one pint
	Water	three pints.

Boil the hellebore and tobacco in the three pints of water to a quart; when cold, add the lime water. Put the whole into a bottle, and cork it well, pouring it out as wanted.

No. 2.—	Oxymuriate of quicksilver (*corrosive sublimate*)	one drachm
	Spirit of wine, or brandy	one ounce
	Decoction of tobacco	a pint and a half.

Dissolve the sublimated mercury in the spirit, by rubbing in a mortar, after which add the decoction.

No. 3.—	Liver of sulphur	two ounces
	Decoction of white hellebore	one pint
	Ditto of tobacco	ditto.
No. 4.—	Finely powdered arsenic	one drachm
	Flowers of sulphur	six ounces
	Barbadoes tar	half a pound
	Train oil	six ounces[*].
No. 5.—	Sulphur vivum	eight ounces
	Stavesacre, in powder	one ounce
	Ointment of quicksilver	two ounces
	Turpentine	ditto
	Lard, or train oil	eight ounces[†].

[*] No. 4 was long my favourite form of mange remedy; and, next to sulphur, there is no individual application so effective as a terebinthinated. Mr. Percivall speaks in high terms of tar and train oil: therefore if sulphur be a specific, and tar little less so; and if in the mixture these do not interfere with each other (and they do not); if a stimulant be useful, which the tar is, then surely it is prudent to unite these benefits; and if so, the veterinarian cannot find a better remedy than No. 4.

[†] Hurtrel d'Arboyal gives as a favourite recipe for mange in France the following: crude mercury six parts; sublimed sulphur six parts; powdered cantharides one part and a half; all which are to be incorporated with thirty parts of lard. The cantharides introduced are intended to act by raising a new irritation on the skin, which, by the effects of the disease, is frequently thickened and hardened,

Previously to the application of any unguent, every excrementitious matter should be removed from the skin, as scurf or scab, by scraping, brushing, or rubbing. This done, wash and supple the surface sufficiently with soft soap and water, which will enable the ointment to reach the parts more effectually. The method of applying the ointment may be left to the discretion of the rubber. I used to direct it to be done by means of a thick pair of leathern gloves worn, which will enable the operator to work it well into the skin, and to spread it well over every part, and to the bottom of any sinuosities. The rubbing for the exposed parts should be repeated every day, and a general dressing should be made every other day. Where the skin is very stubborn, applying the ointment used by means of a hard brush is practised with advantage.

HIDEBOUND.

I HAVE had many occasions of noticing that this popular term is erroneously applied, and that the *effect* is frequently mistaken for the *cause*. It is very seldom that hidebound exists as a *primary* disease of the skin, but as a *symptomatic* affection it is sufficiently common. It is unnecessary to enlarge farther on it; the introduction of it here is merely intended to keep the systematic order of diseases complete. All that regards the practical consideration may be seen by reference to page 67.

CLASS XX.

DISEASES OF THE FEET.

FOUNDER, OR INFLAMMATION OF THE FEET[*].

As the benefits we derive from the horse mainly depend on his locomotive powers, so whatever interferes with these in an essential degree is a subject which merits the consideration of the veterinarian; and how much the destructive affection before us does this, we need hardly insist on. The inflammatory affection popularly called founder exists in two distinct forms, an acute and a chronic; under which heads I shall proceed to consider them.

ACUTE FOUNDER.

THIS may be characterised as an acute inflammatory attack on the vascular parts of the foot generally, but on the secreting laminæ more particularly; and when we consider the extent of secreting surface engaged in the formation of horn, and the immense force of the extension employed in the support of so large a machine as that of the horse, added to the force of his exertions, we cannot be surprised that these organs should become the subject either of extensive primary or the seat of secondary inflammation. Primary phlegmonous inflammation takes place in them from different causes, as from the alternation of heat with cold, exactly in the same manner as it occasions other great idiopathic inflammations; but more particularly here, when extraordinary exertions

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and wants rousing to enable it to receive the full benefit of the *specific*, as the sulphur may be considered. A stimulant to the skin has long been applied in the cure of mange among horses and cattle. Mr. Feron from this was led to recommend 'general blistering modified and judiciously applied as a real specific, but which required repetition.' The practice I believe was never resorted to, as being but little efficacious in comparison with the irritation excited.

[*] The term founder has been objected to as *indefinite*, and involving other diseased states than simple phlegmonous inflammation of the laminæ. It is most certainly *unmeaning* as a term, and should be banished from our nomenclature; but it is not, I conceive, indefinite with veterinarians in general: on the contrary, it is very commonly confined to an inflammatory state of the feet, either acute or chronic, and the *immediate* consequences resulting therefrom: I have, therefore, continued it, until authority or general consent has affixed a more expressive and critical one.

have already distended and thus weakened the vessels. It is, therefore, not unfrequently seen consequent to any great exertions, as hard driving or riding for many hours in succession, which is found still more likely if it occurs in snowy weather, and particularly where the removal into a hot stable has followed immediately. I once saw it supervene on hard driving, the horse being allowed to stand afterwards in the snow some considerable time. Another cause of primary inflammation may be regarded as mechanical, or dependent on the unceasing strain on the laminæ which the erect position, long maintained, occasions, particularly in sea voyages, where it is united with very great stress alternately laid on one or other of the feet in attempting to preserve the perpendicular situation during the rolling of the ship; and the same occurs in a minor degree, when it is necessary to preserve the same position in the stable, by which these parts may be put on the stretch, and congestion takes place[*]. Acute founder may be *derived* from secondary sources, or, in other words, it is sometimes not a primary affection, but the effect of metastasis of inflammation. I have seen the feet receive this morbid state from a translation of the inflammations of many other organs to them, but it is most frequent in pneumonia and ophthalmia: there is, however, no acute attack, and particularly such as are protracted to any length, but what may be translated to the feet, and it is found that occasionally the metastasis operates among themselves also[†]. Founder may be confined to one foot, to two, or it may attack the whole four; but it is more common to the fore feet. I have seen it attack all the feet, apparently occasioned by the weight of the body, and congestion from long confinement.

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[*] If we were not witnesses to this effect resulting from long standing, we might be led to question it as a direct cause, for we have many instances of horses never lying down without contracting founder; but in these cases the parts have probably become habituated to the superincumbent weight.

[†] There are circumstances in this disease which put it out of the ordinary range of topical inflammations. Hurtrel d'Arboval, when describing it as an inflammation of the vasculo-nervous reticular tissues of the feet, adds, 'Cette expansion est le véritable siége d'une inflammation *spéciale*, qui jusqu'ici n'a pas d'analogue connu dans l'homme, et qui, en médecine vétérinaire a reçu le nom de fourboure.' This *speciality* is singularly marked by the variety in its causation. Derange any vital part in the machine, and the vascular secreting structure of the hoof may become affected with phlegmonous inflammation, and which is apparently less the consequence of any primary defect within the feet than of an especial aptitude in them to take on disease, inherent particularly within this immediate portion of the foot. This origin, of which we have now so many proofs, adds much to the singularity of the disease, inasmuch as we have little clue to guide us to the nature of that connexion which can possibly translate the inflammations of organs so structurally different as the substance of the brain, the parenchyma of the lungs, the conjunctive coats of the eye, or the muscular tunics of the intestines, &c. &c., to an organization not in unison with these, individually or generally; and yet so it is. Huzard thus observes on it: 'Cette maladie (Fievre inflammatoire simple) d'abord générale à toute l'économie, se termine souvent par resolution, mais dégénère aussi en affection locale, et se change en affection inflammatoire, soit des poumons, soit de quelques parties musculaires, soit enfin, et le plus souvent dans le cheval en inflammation du tissue reticulaire du sabot.' But which, it may be observed, is not in unison with the majority of the French veterinary authorities of the present day; for we find Hurtrel d'Arboval, who may be considered as their mouthpiece, ridiculing this view of it, although, in another point, he himself is little less liable to criticism. 'Mais une méprise plus sérieuse, dans laquelle pourront tomber souvent ceux qui ne veulent voir dans beaucoup de maladies qu'une affection générale de l'organisme, sans rechercher celle de ses parties qui est lésée, ni quelle est la lésion d'où procèdent les phénomènes morbides qui ont peu s'étendre, cette méprise est celle de ne voir dans la phlegmasie de la chair du pied qu'un phénomène secondaire, accessoire, dépendant de ce que les partisans de ce système appellent une *fievre inflammatoire*, qu'ils définissent une affection d'abord *générale a toute l'économie*, se terminant souvent par resolution, mais dégénerant aussi en affection locale, et se changeant en infection inflammatoire, soit des poumons, soit de quelques parties musculaires, soit enfin, et le plus souvent dans le cheval, en inflammation du tissu reticulaire du sabot; cas dans lequel on dit la fourbure *tombée dans les sabots*.' We cannot but tax this excellent author with a too confined view, when, although he thus admits the secondary origin of founder, he appears to confine it principally to disturbance of the digestive functions. He considers as causes of founder, external violences committed on the feet; the alternations of cold with heat; and imprudence in the use of certain aliments. 'Au nombre des alimens excitans auxquels on accorde la funeste propriété de provoquer le développement de la *fourboure*, on range le blé (wheat), le seigle (rye), l'orge (barley), spécialement, quand s'ils sont verts et épiés, surtout quand les animaux en mangeant beaucoup, sans avoir été amenés de cette espèce, exercent leur première action sans doute sur le conduit digestif, qu'ils irritent; ils determinent des indigestions, et la fourboure *n'est alors que secondaire*. Il est certain que, lors des différentes invasions que les armées Françaises ont faites en Espagne, la cavalerie a toujours perdu beaucoup de chevaux des suites de ces indigestions compliquées de fourbure, ce qu'on attribue à ce que, dans la peninsule, l'orge est plus particulièrement employée à la nourriture des chevaux; or, ce grain etant plus substantiel et plus excitant que l'avoine, nos chevaux n'y étant pas habitués, et les cavaliers ne connaissant pas les précautions nécessaires pour en faire usage, son action sur les organes digestifs n'est pas suprenante. La cavalerie de l'armée Française qui se trouvait en Pologne en 1812 perdit aussi beaucoup de chevaux parcequ'on manquait d'avoine, qu'on remplaçait cet aliment par du seigle, et une de frequentes indigestions compliquées de fourbures se manifestèrent. Mais la plupart de ces indigestions presentaient des symptômes vertigineux; ceux qui pouvaient indiquer l'existence de la fourbure étaient peu prononcés peu appréciables, peut-être même, n'étaient-ils pas bien réels, ce qui expliquerait pourquoi les progrès de la maladie étaient très rapides quand

Symptoms of Acute Founder.—When a horse labours under this complaint, the attendants are usually unconscious of the real nature of the disease; and it is not unfrequent that even the medical practitioner, when called in, does not immediately detect it, unless much used to these cases: for he finds the horse heaving at his flanks, with a quick labouring pulse; and, on inquiry, he hears that the attack commenced with a rigor or shivering fit; that the suffering animal has been lying down and getting up frequently; groaning with excess of pain, and occasionally breaking out into cold and profuse sweats. In such case, unless he be informed that the horse has been ridden or driven with violence, and afterwards exposed to cold; or, unless his eye catches the particular disinclination to remain on his feet, with their extreme heat, he is at a loss, frequently, whether to consider it an attack on the bowels, kidneys, or bladder, or an inflammatory or rheumatic fever. An experienced practitioner will, however, even when called in at first, if the symptoms are not altogether perfectly well marked, still observe, that though the horse appears to suffer much pain, and to lie down and rise frequently, yet that he neither attempts to roll or paw with his feet, nor look at his flanks, or kick his belly; and that even early in the complaint he betrays a peculiar manner of shifting and lifting up his legs, or by placing them so as to relieve the superincumbent pressure, either drawing his hinder much under him to relieve the *fore*, or placing the fore under the chest to relieve the *hinder*, according as one or the other are the principal seat of inflammation; or, by a marked disinclination to remain long up, when the *whole* of them are affected. When the inflammation exists in the whole of them, the horse usually lies almost wholly on the ground (this disposition is, however, not quite invariable); which will commonly distinguish it from visceral inflammations, particularly from pneumonia. We need hardly give any signs to prevent it from being considered as an affection of the loins, rheumatic or accidental; for as soon as the complaint has fully seized on the feet, they will become intensely hot, and the pastern arteries will be found pulsating very strongly: attention to which circumstance will always serve to characterise the disease. There is sometimes some little tumefaction around the fetlocks, and, when one foot is held up for examination, it gives so much pain to the other, that the horse is in danger of falling, at which times the slightest tap on the feet with any thing hard gives evidently extreme pain, and is flinched from most sensitively. If the horse be attempted to be taken out of the stable, his disinclination is so great, as at once to shew the feet to be the seat of evil: in his taking each limb up and setting it down there is something so truly characteristic of the intensity of the pain he feels in them as will not easily be forgotten. The course of the disease is various: it may end in *resolution*, in which case the symptoms all relax, the remains of the congestion become absorbed, and the parts reinstate themselves perfectly. In others, the secreting laminæ diffuse a quantity of adhesive matter within the horny lamellæ, which accretes, and not only destroys the mutual elasticities of these parts, but it greatly extends and deforms the hoof, which sometimes

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elle était occasionée par cette cause, et tels que l'affection se terminait beaucoup plus promptement que dans le cas des fourbures déterminées par les autres causes plus ordinaires.'

Professor Dick, of Edinburgh, entertains a similar opinion of the connexion between the digestive functions, and informs his audience, it is said, that he has frequently seen this complaint arise from gorging the stomach with food; and such is the sympathy, he observes, between the stomach, the alimentary canal, and the surface, that, if we regard the hoofs as a continuation of the common integuments, this is not to be wondered at. *Veterinarian*, vol. iii, p. 201. We cannot but admire the ingenuity of this view: is it, however, equally consistent? The vascular matter, called the coronary ligament, which corresponds with that cuticular portion surrounding the root of our nails, and which we call the *quick*, secretes, and is itself a continuation of the cutis: to establish this continuous march of inflammation, we ought to find that the coronary ligament was the primary seat of the inflammation, but which is almost totally opposite. The inflammation of founder is not one, I apprehend, of continuity, but resembles more the arthritic nature of gout, which vacillates between articular surfaces and membranous ones. If I am not mistaken, this view will solve many of the phenomena otherwise veiled in mist.—*See an excellent paper on this subject from Mr. Castley, in The Veterinarian*, vol. iii.

afterwards comes away, leaving an imperfect attempt at the formation of a new hoof, but usually altogether useless. This effusion, which may be considered as a kind of imperfect resolution, may be known, before its effects on the horn become apparent, by the very peculiar gait the horse exhibits when taken out, and which, once seen, can never be forgotten: for in consequence of the insensibility of his feet, he throws them forward in a seemingly burlesque manner, and brings them down as oddly on the heel. In other cases of imperfect resolution, the laminæ, losing their elasticity and power, yield to the weight and stress of the coffin-bone, which is pushed backwards, and, in its passage draws with it the anterior crust of the hoof, which thus falls in: the pressure also of the coffin-bone destroys the concavity of the horny sole, which, instead, becomes convex or *pumiced*, leaving a large space towards the toe filled with a semi-cartilaginous mass: this is not an uncommon termination of acute founder, particularly in the feet of large heavy horses. When the inflammation proceeds to *suppuration*, the symptoms having raged with much intensity for six or seven days, a slight separation of the hoof from the soft parts may be observed commencing around the coronet, on pressing which a small quantity of either ichorous or semi-purulent matter may be forced out: the purulent secretion soon becomes established, and, totally dissolving the union between the soft masses of the feet and the hoofs, they fall off, when, of course, the animal is of necessity destroyed, as a perfect hoof will never form, from the disorganization which has taken place; although, should mortification not ensue, or irritation carry off the animal, attempts will be made in the parts to secrete a new hoof; but here also it always proves a small, weak, and imperfect one.

Treatment.—As soon as the disease is discovered, proceed to remove the shoes, and, while the horse can yet stand, thin the sole and crust around, allowing him a momentary respite, or he may fall on the operator. If his state utterly precludes his standing up so long, support him by a temporary slinging; for thinning the hoof is so necessary to relieve the internal pressure, that it cannot be dispensed with. The next point is, by arteriotomy, to abstract blood from the toe of each affected foot (see article *Phlebotomy, bleeding at the toe*) to the amount of two quarts from each, if the founder extends all round; but take three quarts from each, if the disease is confined to the fore feet only, as is most common. I prefer this to a larger quantity, as it can be repeated again in a few hours, if necessary; and I have thought an enormous bleeding has tended to produce such collapse as the feet have never recovered from: but I would again urge the necessity of a full abstraction. To encourage the bleeding when it does not flow sufficiently free, the hoofs may be immersed in warm water, or surrounded with cloths, and warm water poured on them. It has been advised (and any means are to be adopted to insure a sufficient local flow of blood) that, when any difficulty arises in drawing enough from the toe, to plunge a lancet, fine scalpel, or seton-needle, through the cleft of the frog, from which a full flow may commonly be obtained; for it must be remembered, that sufficient blood should be taken, not only to unload the vessels of the feet particularly, but those also of the system generally, to be truly useful: if, therefore, it is found impossible to fulfil this indication sufficiently by these means, bleed also by the cephalic, or by the jugular vein: but it must at the same time be remembered, that the local bleeding is, if possible, not to be dispensed with, and also that it may be repeated two or three times, or, indeed, as long as the inflammation is of the adhesive kind only. As soon as the disposition to suppuration has commenced, which is usually about the fourth or fifth day in very acute cases, then topical bleeding might be productive of mortification. In general cases, if local bleeding does not fully shew its beneficial effects by the second, or at most by the third day, it will do no good*. The next indication is the continued application of moisture to the feet, either by wet cloths, or by poultices kept around them; or by the warm bath, if the horse can be made to stand*. In a horse that lay almost incessantly, I wrapped coarse cloths around the feet, and directed an attendant to constantly wet these with the coldest water; and although the inflammation ran so high as totally to prevent the horse rising, and his pulse was at 90, with symptomatic fever, he yet did well. I estimated that this horse lost, topically and generally, little less than forty pounds of blood in three days. I should also, in all very acute cases where there was much plethora, prefer cold applications: where there were age, debility, and emaciation present, I would use those which were warm.

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* An excellent practical remark to those veterinarians who may be likely to pursue their art under a tropical or arid temperature, is offered by Mr. Castley; who informs us that the wound made in the toe in bleeding, was, in the hot climate of Portugal, very apt to tumefy and suppurate until it burst

The *Constitutional Treatment* should be that prescribed for diffused inflammation, except that, while we unload the bowels by back-raking, clysters, and laxatives by the mouth, we should avoid active purgation, which would distress the prostrate horse, and might increase the irritative fever, or perhaps encourage enteritis by metastasis: but mild nauseants, diaphoretics, or other febrifuges may be usefully employed, as the following twice a-day, in a pint of warm water:—

Tartarised antimony *(emetic tartar)*	four drachms
Nitrate of potash *(nitre)*...........................	four drachms
Supertartrate of potash *(cream of tartar)*	ditto.

Allow plenty of tepid water to drink, feed very sparingly, and never force the horse to rise: the recumbent position is the best, as that which favours the return of blood; and, to encourage it, bed him up well: neither, if amendment follows, oblige the horse to use more exercise than he is willing to take around his own box. There is much difference of opinion with regard to the propriety of blistering in this affection, and it is, I think, most prudent to avoid it in the early stage; but I have never scrupled to employ it on the third or fourth day, when the symptoms have not abated on bleeding; in which case I feel no hesitation in recommending to blister actively around the lesser pastern, but to avoid the immediate coronary ring itself. Apply a cradle, and also wrap tow around the blistered part in sufficient quantities to prevent injury to other parts; and should amendment occur, give a caution as to the liability of recurrence on extraordinary exertions for some months. In cases of *imperfect* resolution, thin the feet; and, if contraction have commenced, score the hoofs, blister the coronets, and turn out, or treat as under

CHRONIC FOUNDER.

THE late extension of our knowledge, as regards the diseased states of the feet, has taught us that *chronic founder* and *contraction* are not necessarily synonymous: and for two reasons; one of which is, that every contracted foot is not *morbidly* so, or *foundered*†; the other, that there exists *foundered* states

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out around the coronet: he was, therefore, in these cases, forced to content himself with such local abstraction as could be derived by taking it from the veins of the leg or arm; which veins, however they may be hidden at other times, become now sufficiently evident from vascular distention.

* At Alfort, horses acutely foundered were placed in a foot-bath all day, and if they refused to lie down, as some do, they remained all night in the same: the liquid which formed the bath was a solution of the sulphate of iron (green vitriol). The effects are very highly spoken of.

† So much are we the slaves of prejudice, and so much do we form our opinions on the dogmas of others, that we are apt, in every instance, to connect lameness with contraction of the hoof, and thence, very frequently, to reject a valuable horse, and one perfectly sound, for the usual purposes required of him. The *contraction* I would designate as *ordinary*, in contradistinction to that which is *morbid*, or dependent on an inflamed state, is of very slow growth, and is an almost invariable result of the artificial habits of the horse; and when we examine the complexity of the structure of his foot, we are filled with admiration that the *vis vitæ*, or constitutional powers, are able during a long life to resist all the evils it is liable to, even under the most advantageous circumstances. But such is the case; and yet, perhaps, no horse whatever reaches old age with his feet either of the same shape with those of his adult age, or of equal conical dimensions. Some that are employed in agricultural labour, imprisoned in iron shoes, and in other respects somewhat artificially treated, nevertheless reach thirty and forty years without injured feet. Some are even driven in our carriages to a protracted period, and others are ridden equally long, whose feet remain as perfectly sound as the *natural* solidifying of the machine in old age will allow. How does this occur? for, on

of the feet without *contraction*, or, at least, with little sensible alteration in their size or appearance. Such are exostoses of the bones, ulcerations of their articular surfaces, cartilages, and ligamentary capsules; all which being equally the consequences of inflammation with morbid contraction, are necessarily *foundered states*, although more usually called *groggy lamenesses*. Contraction of the feet, therefore, ought to be divided into *ordinary* and *morbid*, or into that which is the consequence of *mechanical* causes, in which the internal parts of the feet, adapting themselves to the size of the outer, avoid injurious pressure: and into that which commences in, and continues to be accompanied by, inflammation. Such a division can be strictly maintained, and is, practically, very important. It is this latter state which will first occupy my attention; the other causes of a foundered state of the feet will follow in succession.

MORBID CONTRACTION OF THE FEET.

Morbid contraction of the horn of the hoofs, which has been very generally called chronic founder by veterinarians, and *hoof-bound* by farriers, is not more ruinous than common; and, in this country, probably shortens the lives of more horses than all the other consequences of their artificial habits put together. Bountiful Nature furnishes organs adapted to the *natural* wants of animals, but for *unnatural* habits she does not provide; on the contrary, she always punishes *artificial* deviations from her established laws, and has left it to the *ingenuity* of mankind to counteract the evils entailed, by subjecting our animals to a life of art. Among these evils, that of our present inquiry must be deemed a very important one; but on the operation of what *particulars* of this artificial deviation the mischief arises, very different opinions have been formed: it is however clear, that as it is upon a due appreciation of this matter that our principal means of *preventing* the evil must be grounded, so it is of consequence that we examine and compare them separately. It is the most consonant with reason, and will be found to best agree with fact, to consider that the general tendency to contraction in the feet of horses is not dependent mainly on any one of the numerous causes to which it is attributed, but to their *united operation*. Individual cases are dependent on one or other of them, or one or more of them, as those affected are least apt to resist the impression, or become particularly exposed to the operation of one or more among them. The subject is one that has engaged, for very many years, a great share of my attention, during much of which time my opportunities for observation were considerable; and if I have not thrown that time away, the following will be found active agents in promoting contraction. Perhaps it is better to avoid dictating the several degrees in which they act, so variable must such action be in different cases, and under different circumstances. *As operating causes of contraction* we may state,—neglect of paring away the adventitious growth of horn; the application of artificial heat; the deprivation of natural moisture; constitutional liability; the existence of thrushes; the removal of the bars, and a too great lessening of the frog; the effects of pressure, occasioned by long confinement in a state of inactivity, and in an erect position; and, lastly, the contracting effects of shoeing.

That a *neglect of paring* should be considered as an agent in this case will, I

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examining these horses, particularly those of the hackney and carriage breeds, the heels will be found almost invariably somewhat contracted, the frog lessened, and the foot elongated. The only reason that can be given is, that happily the *vis vitæ* stands here as a protector: the horn contracts from the operation of the causes to be detailed, but the pressure is slight only; it is, however, sufficient to occasion slow absorption of the lateral margin of the coffin-bone and the alæ of its heels; and thus the hard parts within accommodating themselves to the hard parts without, the sensible and vascular parts interposed between the two escape unequal pressure: no reaction or inflammation takes place, and thus the feet receive no material injury, although they do not become free from contraction. It has therefore been observed, and with justice, that the sound horse with contracted heels is to be preferred to the horse with wide, open, but weak heels. These practical remarks, however, must not mislead us into an indifference to *incipient contraction*: it must always be regarded with jealousy, unless it can be made out that it has long existed, and the horse is yet sound, in which latter case there is, probably, no cause for dread: but when the sole is excavated, the frog lessened, and withal thrushy, and the heels preposterously high, whatever the present state may be, lameness is not far off.

make no doubt, be considered by some as a questionable opinion, the very contrary having been so strenuously maintained[*]; but such will, I think, become evident on considering the operations of Nature in general, and the structure of horn in particular. By Nature a certain portion of whatever is wanting is given, and a certain portion only. Thus, as regards the horny part of the hoof, it cannot be possessed in any extra degree in height and breadth too. I will not say that a high foot may not in many cases have, if critically weighed, more horn than a lower one; but, *cæteris paribus*, as it increases in height, it decreases in diameter; and, as a principle, this cannot be too strongly impressed on the mind, nor can any rule be found with fewer exceptions. In coach-horse dealers' stables, where four-year old horses frequently stand for two or three months, without perhaps having their shoes removed or changed, this complaint is not only common, but almost every horse so situated becomes contracted in the feet: however, as it is not to such a degree as to cause immediate lameness, so it passes unnoticed; but contraction has commenced, pressure is at work on the sensitive parts within, and inflammation will follow: it therefore is not unusual that when such a horse is sold, often before the force of the warranty is expired, he is returned as unsound: but such is the power of habit, and such is the obstinacy of these persons, that, to avoid the trifling expense of removing the shoes, they risk the loss of the horse. In many cavalry regiments a similar neglect used to occur, and every third horse, or even a greater portion, were observed with enormously high feet, and, as a *certain consequence*, with partial contraction. The system of shoeing in these regiments is generally good, and they never stand on litter, or are too hotly placed; but being shod by contract, the shoeing only was paid for, but not the removes and paring; consequently these necessary operations were neglected: and it is not too much to assert, that this evil, when a long time in operation, would destroy as many horses as an active campaign. But as each regiment is now supplied with a veterinary surgeon, this is without doubt remedied. It is not sufficiently considered that the *wear* the hoof would experience in a state of nature is prevented by the application of shoes: but the *growth* is not *stopped;* on the contrary, by inactivity, warm stabling, and high feeding, it is probably increased beyond its ordinary limits.

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[*] It was the opinion of the French veterinarians, and of M. St. Bel as their copyist, that the *extreme paring* of the crust, the sole, and the frog of the foot, was the leading cause of contraction; and, therefore, on the first establishment of the Veterinary College, all *parings* of the feet were absolutely condemned, and the grand agent in the business, the *butteris*, was sent at once to the d---l. A minute attention to the subject, and a diligent examination of innumerable horses every year, have led me to differ very widely from the general opinions entertained on this head: on the contrary, I consider the popular doctrine of the *evils arising from paring the feet generally* as having been productive of infinite mischief; and that, for one horse injured by paring, many more are ruined by letting it alone. I have watched the proceedings in numerous forges, as well where heavy as where light horses were shod, and I have particularly marked, that where the drawing knife only was used, to avoid labour, the workmen are too apt to neglect paring altogether, contenting themselves with rasping the horny crust to a level, opening the heels, and smoothing the frog. Nor is this to be wondered at; for if the gentlemen who are taught to cry out against this operation were only once doomed to go through the extreme labour of *properly paring out* a foot that is but moderately grown, they would agree with me, that there was much more danger of its being neglected than of its being over-done. A dispassionate view of this matter will prove also that the popular outcry against the *butteris* is carried much too far. The drawing knife is a neater instrument, and, for particular parts of the operation of paring, is infinitely most handy and proper; and it is much to be regretted that its use is not more common among country smiths, many of whom never use it but in cases of surgical practice. Deprive these persons, therefore, of the butteris, and your horse must go unpared; nor would there be any difficulty in proving, that, instead of being so destructive as supposed, it is, when *judiciously* and *dexterously* applied, a very useful instrument, as it will do more work in a minute than the drawing knife can effect in five: and where there are a number of large coarse horses waiting to be shod, many of them with high and large feet, this expedition must prove of very great consequence. It must not from this be supposed that I am therefore an *advocate* for the old system of treating the feet: on the contrary, in most of its parts I *condemn* it: for it is true, that the frog has been too often extravagantly pared, and the bars entirely removed, while the general height of the walls and the entire thickness of the sole have been suffered to remain, with the accumulated horn of many weeks' growth, over which has been immediately placed in many instances a thick-heeled shoe. The sole tendency of what I mean to impress is, that extreme *general* paring seldom occurs; and that the evils of erroneous *partial* cuttings bear no possible comparison to the mischiefs that result from that neglect of *sufficient* paring; to which the outcry raised some thirty years ago has so much contributed, and which has, by its effects, greatly increased morbid contraction. This prejudice raised in the minds of the owners of horses was of infinite mischief, because it was not confined to the removal of the natural quantity of the frog and inflected bar; but extended to the accreted horn of the walls also, which, when shod without paring, was much in the same state which our nails would be with strong gloves sewn on our hands at six weeks' end. Smiths were often forbid to remove even this; and with both the smith and the owners of horses it is too prevalent an opinion that paring of the feet is never necessary but when a renewal of the shoes is required; consequently, if a horse wear his shoes lightly, or is little used, he may not want new ones oftener than once in two months: but the owner appears utterly unmindful that all this time the feet are becoming preternaturally increased in *length*, and if so, preternaturally decreased in *diameter*, for that is the natural and invariable consequence of extra perpendicular accretion; and as the labour of reducing such a foot is considerable, not only from the quantity but also from the hardness of the substance, so the chance that a proper paring will be neglected is greatly increased. Instead, therefore, of a slight rasping once in six weeks, and sometimes even less frequently, for horses who exercise little and wear lightly the shoes should be removed, where the feet grow fast, at least every three weeks; at which time the hoof should have a level paring throughout, so as to bring it to exactly the *natural* height of horn. But, as before observed, so contrary to this is the usual custom, that after an interval, such as we have noticed, a horse goes to the smith's shop with an inordinate quantity of it: the extreme ends of which being far removed from the surface that secreted it become so dry and hard that the smith, even were he so disposed, can hardly make any impression on it; he, therefore, only rasps or burns a smooth surface, and puts the new shoes on the old horn.

The *application of artificial heat* stands next in order as a cause of contraction; and when we consider the common properties of hoof, nail, and horn, it will be found that this cause and the former are closely linked, and that they operate together. These substances, when acted on by heat, become softened; but, when cooled again, having parted with some of the volatile unctuous matter which gave them plasticity, they contract and become harder than before: their fibrous structure in this contraction necessarily lessens the circle they compose; and this equally, whether the heat be applied externally or internally. This action may be easily exemplified by placing a perpendicular section of a hollow cylinder, or cone, as a portion of a cow's horn, before a moderate fire; or the natural hoof may be placed in the same situation, when the contractile effects of the heat will *lessen* the horny segment on whichever side of it the heat operates: and in the consideration of the subject of hoof contraction, these particular circumstances of the operation of heat, either inwardly or outwardly, cannot be too strongly impressed on the recollection. Thus much being premised, it will not be difficult to recognise the application of artificial heat, in a degree much beyond a natural temperature, to the feet of horses in various ways. The standing for years bedded up in hot litter, heated still more by a stable without ventilation, must have some effect on the contraction of the horn of the hoof, and most of all on feet already high; as it has been shewn that the longer the trunk of the hoof, and the thicker its walls, the greater will be the contracting tendency of the horny fibres: consequently here its operation is doubly injurious, where both cause and effect combine to increase the evil in parts already injured. Heat is also generated in the constitution, in stabled horses, in a degree beyond that of others less artificially treated. The excitements of corn, of a heated temperature, &c. must quicken the circulation, and more caloric must be evolved. By a very slow operation of these causes, many horses, we have proved, escape so much contraction as to occasion very active pressure: but many more feel it most sensibly on the internal parts of the feet, which are exactly adapted to the horny envelopement. These being highly vascular and tender, are by this stimulated into counter-action, and inflame; which produces an additional source of heat, and which is increased in a two-fold degree, as the cause continues to operate. There is yet another link to be added to the connecting chain between heat and contraction: heat is known to increase the secretion of horn: if we wash our hands in warm water many times a-day, we shall find an increased growth of our nails; and, therefore, if this be not counteracted by paring, &c., the feet of stabled horses will gain an injurious accretion from this cause. As the organs generally must become heated by the system, so the exertions of hard riding and driving must evolve more heat, and particularly with us, who exert their speed so much: it will also happen, that the very friction of hard roads must have its weight in the sum of prejudicial heat. Another source of artificial heat has been inveighed against in the bitterest terms, which is the application of a heated shoe to the sole of the foot, the evils resulting from which certainly reprehensible practice have been, however, greatly overrated; and the more so, I apprehend, as it is used in some measure as a substitute, though an improper one, for paring; and likewise as in the unequal shoes of country smiths it may be even necessary to demonstrate the bearing points that would otherwise escape notice: nor is the practice ever, I believe, carried to any very hurtful extent.

The *absence of natural moisture* must also tend in no small degree to produce contraction. Moisture has exactly the contrary effect on horn to what heat has; its application, therefore, greatly tends to counteract the contractile disposition. It also softens, and thus enables the pressure arising from the weight of the body to expand the relaxed hoof; but when, by the extreme length and thickness of the hoof, its resistance is increased beyond even the power of the moisture to penetrate, even this benefit, when occasionally applied, becomes lost. In a state of nature it is evident that the hoofs must meet with much moisture, of which a life of art wholly deprives them. A stabled horse frequently does not get his feet once moistened in twenty-four hours: even his only chance from the splashing of his urine is carefully prevented by the litter: but in a state of nature, at least during one-third of his time, these parts are exposed to the dew, and, during the remainder, are frequently immersed in rivers and ponds. Horses also less artificially treated than those of the gentry, as farmers' horses, and the generality of those kept in the country, experience the benefits of moisture to a certain degree; for they get turned out occasionally (many live out altogether), and consequently we find they are much less subject to this evil.

Constitutional liability is certainly likewise a source of contraction, and this to a considerable degree; but the remote cause of this tendency it is not easy to account for, any more than the constitutional liability to cataract. It is probable that both were originally connected with the life of art we have subjected the animal to: for it would be an attack on all-bountiful Nature, which she does not deserve, to suppose she has *originally* given so destructive a disease as ophthalmia must prove to a wild horse; and founder would prove scarcely less so. The long continuance of these diseases has, however, stamped the disposition on some structural peculiarities; and both are become somewhat *hereditary* and *indigenous* likewise. It is, therefore, common to some breeds, and most so to the horses of the East. In the arid plains of these countries a small foot was not only sufficient, but also most convenient; while the moist pastures of the North required a broad flat support. When, therefore, this breed was introduced to this kingdom, and became universally diffused among us, we cannot wonder that the small foot became propagated also, which, not being natural here as there, might easily prove a source of mischief. There are now, however, very few of the lighter breeds which have not some small portion of what is called *blood* in them; and it is in these it is most met with, and most injurious; while those that are original and purely northern, as the heavy cart horse, and some of the mountainous or original highland breeds, it is remarkable, are much less affected with it. Some colours also seem to have a greater disposition to contracted feet than others: in dark chestnut horses it is particularly common; and I think the better breed of blacks are rather more subject than some others: white feet also, as being weak, are very liable to it. It is possible that the temperament in some breeds tends particularly to it: wherever there is a ready excitement of the system, heat must be more readily evolved, as in the ardent disposition of the Eastern horse; and some colours may possess this tendency also: thus stallions are very frequently seen with it, in which greater confinement probably adds to the evil. It is, however, to the accidental causes of increased circulation and the evolution of heat, that we must mainly attribute the tendency; for we have ample proofs of its existence long before these breeds were common among us.

The *existence of thrushes* is too much passed over among horsemen. I am fully persuaded that they operate in contraction in a greater degree than is usually imagined; and in many hundred instances I never met with a truly *harmless* thrush. It is said that they are more a consequence than a cause, with which I have nothing to do here. I do not deny they are a consequence, seeing whatever inflames the vascular texture of the foot will disease it throughout, and by suspending the natural secretions of horn will encourage others, as the matter of thrush. It is in this way that thrushes are so common among young horses too fully fed and too much confined: originating in a general inflammatory tendency, particularly felt in the extremities, from accumulation. These, for awhile, may appear harmless; but gradually they spread the action to other parts, and contraction commences as a necessary consequence. Pus exudes from every thrush: pus cannot be formed without inflammation, nor inflammation without heat; and having proved the slow but certain consequences of heat, as promoting contraction, we may add this to the account. (See the subject of *Thrush*).

The *destruction of the bars, and too great lessening of the frog.*—That both these errors are productive of contraction there can be no doubt: but I cannot help thinking that the particular attention to these immediate causes, when veterinary medicine first became regularly studied among us, has been productive of considerable harm; not as being in itself erroneous, but because it diverted the mind from causes of the evil much more active and mischievous. In the generality of country-shod horses, the bars are always cut away, let ever so little other paring take place; yet these horses have less contraction than others: and though the frog also be described as a wedge-like cushion, purposely placed by nature to keep the walls asunder, a very little examination of the parts will shew, that although it certainly does act in this way, yet it cannot be so all-powerful an agent as has been supposed, having but little solidity and force: presuming, therefore, on the natural insufficiency of the frog as a very active agent in preventing contraction, it is evident that the simple lessening of it cannot tend greatly to produce contraction: and we are further led to this supposition, from observing that many horses remain with open heels, who are deprived of the action of the frog, either by its being cut away, or by the operation of the calkins of the shoe, which effectually elevate it beyond the requisite pressure, to enable it to act as an expander. Very different, I apprehend, are the operation of the bars; not but that they are often destroyed by the butteris, in the slashing work made on coarse feet, without much apparent injury; but here the predisposition is not great, and, the other causes of contraction not being in action, the weight of the animal, the moisture he meets with, and, above all, the constitutional powers, resist the tendency. But in other cases, we feel assured that their loss must promote contraction, when we observe that their mechanical intention cannot for a moment be mistaken as any other than a counteracting *bar* to contraction, and that consequently their removal is injurious*.

The *effects of pressure from long standing.*—This is by no means an uncommon cause of founder, both acute and chronic. In violent inflammations which prevent horses lying down, it has been already noticed how it produces the acute kind. It occasionally, likewise, by the effects of congestion, produces the chronic also. Instances are not wanting where it has taken place in one foot from favouring the other which was lame. Weeks and months occur, in some cases, when horses cannot lie down; under which circumstance contraction is likely to take place, by an inflammatory action excited: for this reason it comes in long voyages often, where the heat and confinement must prove very active agents, as also the immense strain which must be put on the laminæ in the endeavours to gain a firm foothold in the rolling of the vessel from side to side. It may be argued, that some few horses never lie down; but I believe it is not proved that their feet remain always free from contraction; and even were it, the tendency so notoriously familiar to us would not be disproved. It may, in some cases, be resisted by the powers we have insisted on; but it still remains an active agent in contraction.—The *contracting effects of shoeing* come lastly to be considered, which, from the importance of the subject, I shall do in a distinct article.

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* 'We can also perceive what protection these bars must form against the contraction, or *wiring in* of the quarters. If they are taken away, there will be nothing to resist the falling of the quarters when the foot is exposed to any disease or bad management, which would induce it to contract. Again, we see the security which they afford to the frog, and the effectual protection which they give against the pressure of the lateral or side parts of the foot. Then appears the necessity of sparing and leaving them prominent when the foot is pared for shoeing. The horny frog, deprived of its guard, will speedily contract, and become elevated and thrushy; and the whole of the heel, deprived of the power of resilience or re-action, which the curve between the bar and the crust affords, will speedily fall in.'—*Farmers' Series*, p. 284.

THE SHOEING OF HORSES,

CONSIDERED AS A CAUSE, A PREVENTION, AND A CURE OF CONTRACTION.

The former editions of the VETERINARY OUTLINES presented, according to long usage, a chapter on the shoeing of the horse; but it must be evident that the curative principles of the veterinary art, which this work professes to teach, has nothing further to do with the subject of shoeing, than as it may be brought in aid of the prevention or cure of disease. I shall, in the present instance, therefore, confine myself to these views, introducing in a note only the form of shoe which, by its general adaptation and freedom from palpable defect, may be supposed to contain as much as possible the united qualities of *protection and prevention*[*]. An authority of no mean note laboured many years to prove that all shoeing of horses whatever, whether good or bad, had a tendency to, and actually did produce contraction; and this ingenious author had well nigh persuaded some orderly folk to ride their horses unshod: but on reflecting that

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[*] The *seated shoe*, first brought prominently forward by Osmer, next adopted by Mr. Clark of Edinburgh, and taken up by Moorcroft, is that which has been much employed in the practice of the best veterinarians, and extends now to most good forges. It may be modified in various ways: it may be made wider or narrower, heavier or lighter; or it may be steeled to meet unusual wear; but the principles are probably adapted to the protection of *most* healthy feet: and no one that ever was or ever will be formed, will be applicable to every foot. A standard pattern shoe is therefore an *ignis fatuus*, long sought for, but never found; though much ingenuity and research have been wasted in looking for it. All shoeing must bend to circumstances, as those of form, place of wear, peculiarities in the method of progression, &c. &c. Even that which is said to be an invariable principle, *that the shoe must be made to the foot, and not the foot to the shoe*, is only so in degree. For in a diseased foot, or one getting out of shape by injudicious shoeing, the shoe must adapt itself only in a degree to the foot: by a slight deviation from the general principle at each shoeing, we shall at last bring back the ill-shaped foot to allow of a well-shaped shoe then to be in future made use of. A well-made *seated shoe* should present a *web* of uniform thickness throughout, and of a width sufficient to protect the foot; but both this and the thickness should be regulated by the size of the horse, nature of the work, &c.; but it should in all cases be sufficient to obviate the effects of occasional hard wear, or the occasional neglect of renewing. To an animal so strong as the horse, the addition of *weight* of one or two ounces to each shoe is very inconsiderable; but this addition to the *support* and *protection* of the foot is very material in many cases. Had the majority of horses perfectly healthy well-formed feet, and had the greater numbers of them only moderate work on level roads to perform, then a shoe altogether lighter in weight and less in frame might be sufficient. But it is to be considered, that there are very few feet met with but what have undergone some unfavourable alteration which makes them somewhat sensible to the effects of concussion; add to which, a great proportion of the horses in general use are worked, at least occasionally, very hard, and often on very bad roads. It is therefore, under all these circumstances, that I would recommend rather more thickness as well as width than is sometimes employed for the web; particularly where there is any tenderness in the feet, and still more so where corns exist. As some guide also, the web should be so thick, that when placed on the pared foot, the pad of the frog should be just on a level with the ground surface of the shoe; by which it will be sufficiently protected, and yet meet with that degree of pressure which Mr. Coleman thought so necessary to the healthy functions of the foot. To recommend that the heels should stand less wide than they usually do, is so greatly in opposition to the directions commonly given, and to the ideas entertained on the subject, that I should lay myself open to animadversion in doing it; but whoever will attentively examine a shoe, '*well set off*' at the heels, as it is termed, will find often only one-third of the surface, sometimes hardly that, protecting the heels; the remainder projects beyond, and serves no purposes but those of a shelf to lodge the dirt on; a convenient slip for another horse to step on; or a more ready hold for the shoe to be forced off by in clayey grounds. So that the shoe heels stand wide enough to allow for the growth of the foot not to draw the points within the crust, it is sufficient. The length of the heels should be regulated by the nature of the work and the form of the foot; where the heels are round, and overhang at all, the shoe should be of sufficient length to receive and guard them; but where hunting is followed in a clayey country, any extra length is dangerous, as forming a resistance; and some horses force off the shoe by lodging the hind toe on the projecting heel. The ground surface of the shoe should be critically flat; nor should any shoe be put on a foot that has not been first tried on a plane iron, kept for that purpose; which practice would prevent the evil of applying a thick club-heeled shoe to the weakest part of the foot, as is too often done. This surface is fullered, and is then punched with either five nails on the outer and four nails on the inner side, or with four on the outer and three on the inner, according to the size and weight of the shoe and tread of the animal. This disproportion is occasioned by the greater thickness and strength of the outer side, which will thus admit of the principal attachment to it; and also because, not only is the inside the thinnest and weakest, but for the reason that expansion probably is greatest there; at least we know contraction principally occurs there: the inner heel is the first to wire in, and the inner heel is commonly the seat of corns. It is, therefore of consequence, that we put as few nails as possible into the inner side of the foot, and those should not approach the heel, but reach only to the centre of the wall: the nearer the last nail-hole is to the toe, provided the shoe is firm, the more room is left for such a foot to expand. The foot surface of the *seated* shoe presents a bevelled portion over two-thirds of its extent, except at the heels, where it is entire as on the ground surface, which plane portion is intended to receive the

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heels. This bevel or seating allows for the descent of the sole, which certainly does take place in a slight degree: but principally it favours the ejection of stones, &c., which lodging there might injuriously press on the horny sole. The seated shoe is the only one which can be worn with safety by the flat-footed horse; it is also rendered lighter by seating, without detracting from its strength. An outward seating, according to the plan of M. St. Bel and some later practitioners, presents at first sight an appearance of following nature, and of giving a surer support by a more pointed pressure downwards, with an equally stable support upwards; and if we could make shoes at once ductile and durable, this would, for all well-formed feet, be an excellent mode: but, unfortunately, this outer rim soon wears down, and the expectations raised relative to its utility are not fulfilled; and what is worse, the shoe must either be rendered improperly thick, or this loss of lower rim will weaken it. Whenever frosty weather, hunter's shoeing, or heavy draught work, makes *calkins* necessary, the utmost caution is required to avoid elevating the outer heel *only*, as is sometimes done. If two calkins be not used, at least thicken the inside heel to an equal height with the outer: otherwise great danger of straining the tendons and ligaments will occur. The *hinder foot*, it may be remarked, is rather straighter in the quarters, and it is advantageous for the foothold that the shoe be made a little squarer at the toe than even the toe itself, which squaring, by shortening the toe, also assists in preventing over-reaching; the tendency may be also still further counteracted by bevelling the front lower edge of the shoe away.

A judicious preparation of the foot for the application of the shoe is, in many points of view, even more important than the framing of the shoe itself; and the younger practitioner, and the amateur even, will do well not only to consider it so, but to frequently watch the process from beginning to end. The operation is, of course, commenced by pulling off one old shoe: for it is better never to take more off at once, otherwise the horse is apt to break away the edges of the horn while standing so long bare on the rough ground or pavement. In removing the old shoes, great care is necessary that the clenches be first thoroughly raised, so that the crust may not be torn, or portions of the nails left within the horn. This being done, the rough edges of the crust should be rasped, which prevents its breaking away when set down, and detects any stubs of old nails left behind, as well as removes loose portions that would hold gravel, either of which might turn the nail that may chance to be introduced there. The next process is to thoroughly pare the sole throughout, until it can be what is called '*thumbed*,' or felt to spring by a forcible pressure of the thumb. In this paring the natural form of the arch of the sole should be as closely imitated as possible, and particular care taken that no part of it be left to protrude beyond the line of the crust; on the contrary, its concavity ought to commence immediately from the line of separation between the crust and sole, but not from the edge of the crust, as I have seen done. The whole thickness of the crust, be it more or less, ought to be left perfectly flat for the bearing of the shoe. Habit, and a correct eye, can detect any equalities in this surface, without a momentary application of the heated shoe to try the bearing parts, as is usually done; and which, if the shoe be also previously tried with a plane iron, may very well be avoided, although the outcry raised against this practice is, in a great measure, unnecessary; for, unless the shoe be very hot, and held on too long, no harm probably results from its application In common rough shoeing, also, this error is infinitely less than the application of the unequal pressure which it is intended to prevent would prove. The portion of sole between the bars and quarters should be always pared out; and, if properly done, is the surest preventive against corns. The heels should be an object of great attention, and ought to be carefully reduced to the general level of position which it may be supposed the hoof was originally placed in, and which may always be judged of by observing the line of the pasterns with it. (See *the remedial treatment of high and contracted heels*.) It is of great consequence that the inner heel be not reduced beyond the outer: its natural weakness gives it a tendency to increased wear: instead therefore of paring both equally, in such a case pare only the outer, and moreover set the shoe very lightly on that heel. A want of attention to this circumstance of inequality in the heels lays the foundation for corns and splents. I have yet made no mention of the frog, which is, in general, almost the very first object of attack as soon as the knife or butteris is taken in hand; but I would, on the contrary, recommend that the sole, crust, and heels, be first attended to, and then a mistake in paring the frog is less likely to arise: for it may be regarded as a general rule, that when the frog is a very little beyond the level of the returns of the heels and the crust, it is as large as it ever ought to be; the heels of the shoe will raise it sufficiently for protection against too much wear, but will not elevate it beyond a proper share of pressure. Smiths are too apt to be impressed with an idea of *opening the heels*, which, with them, is nothing more than cutting away the edges of the inflexions of the hoof, where they turn to form the horny heels, and are continued under the names of bars or binders. In contracted feet these inflexions sometimes press inwards, and actually squeeze the frog; from observing which, smiths cut away the extreme edges of the pressing part; and as, in such cases, this practice is observed to give some relief, so it has become a principle in their minds that it is a salutary process to every foot; and as it leaves a momentary appearance of widened heel, it is not possible to convince them but that a *real* enlargement of the posterior part of the foot is the consequence. It is hardly necessary to remark, that this practice is founded on the grossest ignorance, and that, instead of eventually opening the heels, it tends permanently to contract them, by weakening the bars; the practice should therefore, in every instance, be forbidden, except as before mentioned, in cases where the inflected heels contract or '*wire in*' so much as actually to press the frog between the horny edges, when it is justifiable to relieve the immediate pressure by cutting out the binding portions of the inflexions; but it must not be forgotten in this case, that the remedy is only palliative, and more permanent means should be adopted for the healthy expansion of the parts. Although the returns of the heels are only to be meddled with in such cases, and the *continuation* of the horny inflexion or bars in no case, it is yet otherwise with the intermediate portion of horn which fills up the angle; this should be pared out, in every instance, moderately: it is the seat of corns, and if accidental pressure alight here, a corn is the inevitable consequence: if a small particle of gravel lodge here also, each step forces it further, and, as soon as it has reached the sensible parts, inflammation and suppuration ensue. In every case, therefore, judiciously remove this intersection of horn as a prevention of evil. In the course of the remedial treatment of contraction, &c., other matters connected with the preparation of the foot preventively and remedially will appear.

constant attrition against silex, in all its unyielding forms, was worse than the application of a *protecting* though *unyielding* ring of iron, horse shoeing was continued as the lesser evil, and will probably be so as long as horses and hard roads are brought together. There is no doubt, however, that Mr. Clark was right in assuming the general tendency to contraction, although it has been denied, because it is observed to be resisted in farmers' horses, and occasionally in a few others blessed with a double portion of the capability of resisting the ordinary effects of art. For if the foot is framed on elastic principles, we may be assured that it was naturally intended to expand at every step and at every rest also; consequently that any imprisonment within an unyielding case frustrated Nature's intentions, and necessarily disarranged some of the functions of the foot. Now deranged functions always *predispose* to disease, and nothing but very great constitutional powers can resist the application of constant injurious causes, or otherwise the *vis medicatrix naturæ* must be in constant and full force to repair the breaches made in the organs. Mr. Clark's error, therefore, appears to have been, that he lost sight of this *preservative power:* his zeal blinded him to the fact, that thousands and tens of thousands of horses shod on good principles, and a very great number on bad principles also (at least such as appear so to us), remained sound-footed to the end of a long life. Convinced at length that horse-shoes were, although an evil, yet a necessary one, this gentleman set about devising different methods of attaching them without the evils of fettering the foot by nailing them to it. Here he was foiled also in his ingenious endeavours; and he is now content, with the rest of mankind, to use an iron ring, and to nail it to the foot; but though this is recognised by all, mankind differ very widely on the form of the shoe, and subordinately so, on the mode of attaching it. Horse-shoeing may be divided into simply protecting—protecting and preventive—and remedial. The *simply protecting shoe* is that employed for cover of the feet of agricultural and other horses employed in heavy draught work. A shoe at once *protecting* and *preventive* of contraction has been a subject of much controversy and speculation. Lafosse thought that by shortening and thinning the heels of the shoe he should leave the heels of the foot and the quarters at full liberty to expand; but his shoe was adapted for very strong feet only, and put the tendons so much on the stretch in all, that it was not long found applicable even in his own country, and still less here, where our hard roads and our harder riding require a full protection to the foot. The shoe of Osmer was a vast improvement on the French method, which was, with some modifications, adopted by St. Bel, and at first found an advocate in Mr. Coleman also, but whose penetrating mind soon discovered that much more was wanting to counteract the tendency to contract that domestication produced in the feet. He first extended the heels of the short shoe to the

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Colt shoeing.—I am induced to '*travel out of the record*' by two considerations, too little attended to in the early shoeings of our horses. We have no '*Whisperer*' now; Sullivan left not his cloak behind him; and we have too many failures on the principles of *Jumper* to advert to them. Of these notorious personages see an interesting and entertaining account in the *Farmers' Series*, art. *Horse*, p. 331. Prevention is better than cure; therefore, from the moment a colt is taken in hand, accustom him to have his feet gently taken up; tap them with something; affect to rasp as though he was at the forge, encouraging him at the time. The first time he does enter a smithy should be marked with every gentleness, and at no time done when any effluvia is present from oils, nor when any force is being employed on another horse; one fright now will take months or years to eradicate. Take him with a companion or field-mate if possible; let the smith approach him with gentleness, and encourage him, and do this in preference to blindfolding or twitching; remembering that the connexion of ideas is lasting on the brute mind, because less likely to warn by ratiocination than in ourselves; although they certainly reason, combine, and draw inferences. Let the whole process be completed with equal mildness, and, after three or four times thus shod, that horse is insured to be 'quiet to shoe' ever after. Those who, like myself, have seen valuable colts rendered worthless, and even a nuisance, from their resistance to shoeing, merely by want of an early initiation on proper principles, will acknowledge these cautions not to be irrelevant. The *second consideration* is, that the smith have it pointed out to him, that the two sides of the foot are not formed on the same line of circle, but have a very different contour: it has been familiarly but expressively described, as furnishing in the unshod state more than a semicircle on the outer quarter, and less than a semicircle on the inner. The usual shoe being formed on the principle of a regular semicircle, if applied, must occasion the young foot to be altered to the shoe. Here let the principles already laid down operate; let the shoe be made to the natural shape of the foot: artificial habits and exertion will alter it fast enough; but as long as the expansive line of support on the outer quarter can be retained, let the web of the shoe be hammered out to it, which will relieve the bearing on the inner and weaker half of the foot.

heels of the frog, but made them much thinner than the toe part, purposely to bring the frog to the ground; impressed with the principle of Lafosse, who considered the contact of this natural pad with the ground an essential support to the tendons when in action, Mr. Coleman added to this an artificial iron frog, which, by its constant pressure on the natural frog, was to keep that in health, and assist in forcing open the contracting heels. There was also a clip added to each heel, which, by embracing the junction of the bars with the heel, seemed to promise an expanding effect on the hoof generally. This plan, with the addition of the outward bevel, was ingenious, and in my opinion must be considered great improvements on our preventive system of shoeing; but as the method of application got into other hands, and was ill-managed, it not only failed in good effect, but did harm also, bringing undeserved odium on the plans, which were in themselves good; and when they came to be added to shoes with equal thickness throughout, were valuable improvements. Equally ingenious was the Professor's frog bar-shoe, intended to protect weak heels, to relieve corns, and, by offering a constant point of support to the frog, to diminish the tendency to contraction. But it was found that, although this was an excellent *remedial* invention for diseased feet, it was not of general application as a *preventive* of contraction; and it became almost superseded by the introduction of the spring-heeled shoe, which is of more general utility, as obviating *hurtful* pressure on the heels, and furnishing them with useful elasticity by *healthy* and *moderate* pressure; and also *greatly* assisting weak quarters and heels, and encouraging the growth of the frog. Of Mr. Bracy Clark's paratrite it is only necessary to observe, that the principal it was formed on, of applying a shoe without penetrating the hoof with nails, was excellent; but there is reason to believe such intention will ever be frustrated by the force of the exertions of the horse requiring such an adaptation as shall make the shoe and the foot one solid and united mass, and which can only be done by the intervention of nails. The industry of this ingenious and determined foe to contraction not having been rewarded in his former attempts by the success his sanguine expectations led him to hope and his industry merited, he revived and improved, by a concealed rivet, the jointed shoe of by-gone days. The original may be seen well figured in the *Ecole de Cavalerie of Gueriniere*. It would seem to promise much, since the evils of early wearing away of the joint are much obviated by the great improvement of a concealed double rivet. Such joint, to be complete, should, however, have its motion strictly guarded to horizontal expansion only: any other motion must operate in loosening the nails and breaking the crust. On such a principle this shoe could not fail to be useful; but it is much to be regretted, that whatever its merits, workmen are not readily to be found who will or can make it so as to extend its benefits universally: it, however, well deserves a very full and fair trial[*]. Another eminent veterinarian and practical shoer, by birth, parentage, and education, Mr. J. Turner, of Regent Street, has brought forward a shoe purposely formed to allow due expansion of the foot, and to combat the evils of contraction: and if, in the arduous duties of the road and field, it is found to be sufficiently secure in its foothold, we have yet a prospect of combating this foe to horse-flesh. These benefits are attempted by the use of 'a shoe of moderate substance, and of equal thickness at toe and heels, to be nailed at the toe and outside quarter, with an extra nail or two at the outside heel, but not a single nail to be driven or hole punched in the inner half of the shoe, except one a little inclined to the inside toe.' I must again remark, that my fear with regard to this shoe is its insecurity under extraordinary pressure or great inequalities in the road or field, on which, however, Mr. T. is very sanguine[*]. Still, should it apply only to such horses as are ordinarily employed as hackuies, and to the carriage horses of the nobility and gentry, it is yet a great acquisition as a *preventive*. *Remedially* it seems to promise much more, as we are candidly informed by Mr. Turner that the discovery of its beneficial effects as a remedy for contraction was made after its accidental application in a case of cutting.—See *Veterinarian*, vol. ii. It remains for us to observe that it was some years ago that these remarks were made; the intervening time has, however, only served to increase the reputation of this method of shoeing, at least such is the account we receive from various quarters. In no part of the different manual treatments of the horse are the modern practices of shoeing more nearly perfected than in the present day.

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[*] As I have not many opportunities, at present, of inquiring into the merits of this system of shoeing, I must offer what is said of it by others, who, living in the very scene of action, must be supposed to have ocular demonstration continually before them. Every thing emanating from Mr. Bracy Clark is deserving a respectful attention; but as the very weight of his authority might mislead, that alone is a sufficient reason why it should be more closely examined. The excellent writer on the subject of *The Horse*, in the *Farmers' Series*, p. 319, says of this shoe, ' This is a most imperfect accommodation of the expansion of the foot to the action of its internal parts; and even this accommodation is afforded in the slightest possible degree, or rather can scarcely be afforded at all. Either the nails fix the sides and quarters as in the common shoe, and then the joint at the toe is useless; or, if that joint merely opens like a hinge, the nail-holes in the shoe can no longer correspond with those in the quarters, which are unequally expanded at every point; and, therefore, there will be more stress on the crust at these holes, which will not only enlarge them and destroy the fixed attachment of the shoe to the hoof, but will often tear away portions of the crust. This has, in many cases, been found to be the effect of the jointed shoe; the sides and quarters of the foot have been broken, until it has become difficult to find nail-hold. This shoe, to answer the intended purpose, should consist of many joints, running along the sides and quarters, which would make it too complicated and expensive and frail for general use.' These are certainly drawbacks on the prospect of its permanent utility; but there is another, adverted to by Mr. Turner, that is more than equal to them; and, with all the latitude that we would allow as coming from an opponent, the tax is almost unanswerable. After a cursory notice of the above defects, he adds, ' Let it, for argument's sake, be admitted, that the weight of the animal in quick motion is such as to overcome the restraint of these eight opposing points, and that in the *scuffle* (for I can call it by no other term) between superincumbent weight, force, and resistance, the joint of the shoe does give a little, and concussion is moderated; let us consider the situation of the same hoof, in the same shoe, while the animal is in a quies-

CHRONIC FOUNDER [*continued from p.* 511].

Symptoms and Appearances of Chronic Founder.—The hoof, from an almost circular form (see *Description of Foot*), becomes, when foundered, much elongated; and, on taking up such a foot, the frog, instead of a full bold appearance, seems wedged and squeezed between the contracted bifurcations of the heels, which, in these cases, usually experience the greatest share of the contraction, and are then said by dealers and grooms to be *wired in*. Some contractions operate on the whole circumference of the horn; more frequently, however, the heels, as being the thinnest parts, suffer the most; and the inner one, as being the weakest of the two, is generally more drawn in than the outer: nor is it uncommon for contraction to be confined to the inner side only. Sometimes, however, it affects the whole of the cylinder of the hoof equally; sometimes it is greatest round the coronet, and at others it is most lessened towards the sole: but contracted heels more frequently present their narrowest surface below. From the different degrees of inflammation which have existed at various times, the hoof is often encircled with horny rings, and which are more common in the weak thin foot than in the strong. The hinder hoofs, though not wholly exempt, yet are infinitely less liable to contraction, from the absence of many of the exciting causes present in the fore. They are in the first place thinner at the toes, and thicker at the heel, which greatly destroys the contracting tendency. They are much less exposed to heat and to pressure, and meet with more occasional moisture; and when they are contracted, it more usually affects them throughout the whole circumference; nor does the con-

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cent state, tied up by the head in his stall twenty-two hours out of the twenty-four, and we shall find this jointed shoe of Mr. Bracy Clark's to be a *fetter* with a vengeance, under the disguise of *liberty*. The weight of a horse alone, unaccompanied with action, is quite unequal to the restraint of the nails; and consequently the joint at the toe of the shoe becomes a nullity, leaving the heels exposed to severe partial pressure, as with the common shoe. Contraction of the foot being principally engendered in the stable, this is the period of danger, although exertion afterwards out of the stable is the exciting cause of lameness.'

[*] In proof of its security, Mr. Turner says, 'I have subjected it to the test of road-work equal to posting. But the fact is, in the majority of instances, no more is necessary than a little extra nailing, as to number, in the outside quarter, accompanied with small clips judiciously applied, in order to secure the shoe during a month's wear. It will hereafter be seen, and I pledge myself to shew, that if the inner wall or half of the foot be duly protected, free of restraint, that the outer wall, or other half of the foot, will take care of itself, or rather is capable of resisting the restraint which the shoe and nails oppose to it.'

traction of the hinder feet produce such serious consequences as that of the fore. From the causes before detailed, contracted hoofs are almost always higher than others, and the sole is likewise generally concave: it is in general much thicker in substance also, from an inflamed state of the vessels increasing the secretion of horn: this increase is most painfully felt in progression, and little less so when standing in the stable, the weight of the body obliging the horse to relieve himself, by alternately placing each foot forward, which grooms call *fencing*, or *pointing*. Whenever, therefore, this is observed, however free from lameness the horse may appear, such feet are diseased: and generally on a close inspection one may detect a shortened step and 'feeling' mode of going, although at first not in a great degree; but as the evil increases the tenderness will likewise, and eventually be such as if the horse walked on hot irons: the proper sensibility will seem to be lost, and he will often not step true, but trip and stumble. This state comes on slowly or rapidly, as the contraction is retarded or hastened by circumstances; and also some feet are so constituted as to bear much lessening before actual lameness appears, and others very little. The causes of contraction, be they what they may, are always most painfully increased in their consequences when a neglect of paring occurs, for in such case the pressure of the increased quantity of unyielding horn stimulates in a greater degree the highly inflamed vessels to deposit coagulable lymph between the laminæ and over the sensible sole, which, while it produces a morbid sensibility, destroys the natural one, and occasions these cases to be expressively called, by the common farriers, *numbness* in the feet. The evil does not, however, usually rest here, but the inflammation extends to the bones and cartilages; and while the former throw out bony spiculi around, the latter become almost wholly absorbed, and their place supplied by osseous matter, when extreme and irrecoverable lameness inevitably ensues.

Treatment.—From what has been premised, it will appear that contraction may arise from an inward or an outward cause; that is, that when a constitutional liability exists, or is promoted by any causes which raise universal plethora or inflammatory tendency throughout; or from slight disorganization having taken place after acute founder, which has left some inflammatory action behind; in such cases it is the internal part of the feet which, becoming inflamed and heated, contract the horn inwardly. Here, even the removal of the contraction will only remove the immediate pressure; for the permanent cure, we must also remove the effects which have been occasioned, and prevent the renewed action of the causes. In other cases, some of the outward occasional causes have operated the contraction, and the constitution generally has less to do with the heat which has been wholly or in part generated without, or the outward contraction has brought on some slight re-action within, and together increase the evil. It therefore is important to the prognosis and cure, that the practitioner form a correct opinion of the origin of the disease, as that, if not wholly, will assist in judging of the internal state of the foot, before he gives an opinion, or proceeds to act. In some of the former kind, no means would be equal to a perfect cure; and, consequently, it would not be prudent to recommend a tedious and expensive process, when a palliative treatment only ought to be adopted: but, in the latter cases, a perfect cure might often follow a judicious mode of treatment, and therefore these circumstances would not deter him from acting. This judgment can only be formed from a close attention to appearances and facts: if the contraction have not existed long, or even if it have, and has proceeded very slowly; and particularly if it can be learned that the horse, from confinement, neglect of paring, and other artificial habits, has evidently been exposed to the *outward* causes producing contraction; then there is reason to hope that the internal parts are not irremediably affected.

To *Enlarge the Contracted Hoof*, many mechanical contrivances have been invented; some of them very ingenious, and most of them more or less productive of the desired end: but, unfortunately for all of them, as soon as the expanding processes are laid by, contraction recommences. We are apt, in the outset, to look on contraction too mechanically. It is often an effect only of disease; and when it is the cause, it frequently happens, that ere any treatment is put in practice, it has altered the parts within, absorbing some, and occasioning morbid deposits around others; so that in operating the expansion we have forced the hoof almost from its attachments, and as it is not often that the disorganization is repaired, particularly the absorbed sides of the coffin-bone never are replaced, so the hoof, no longer under the expanding forces applied, again falls into its old attachments; again pressure takes place, disease is renewed, perhaps in a less degree, but eventually the same result happens with all, that, sooner or later, the feet are rendered permanently lame. In such cases, also, as exhibit decided benefit from any expanding means, it seldom happens that sufficient care is taken to prevent the action of the occasional causes becoming again applied. If they were, I am persuaded that the benefits might be rendered permanent in some: but contraction having once occurred, it requires the utmost vigilance to prevent it again taking place, from the circumstances that the alteration within having followed that without, but that within not readily following that made without, a collapse of the outer towards the inner will certainly follow the application of the original causes.

The oldest remedy for contraction was *drawing the sole;* which, as I believe, is a most ineffective and most certainly a brutal remedy, though even yet advocated and practised by some French veterinarians. The next remedy was the old screw shoe, which was little more than a common shoe jointed at the toe, and having a screw at the heel, by which it might be expanded at pleasure. This shoe has been in use even lately, but has many objections to it: one common to this, and to all expanding shoes, is, that in many cases the action commences at the wrong end; for contraction is found greatest around the coronet sometimes; and when in the heels and quarters, one only is probably drawn in: its action is, therefore, partial and confined, to obviate which I adopted shoes whose joints were variously placed, according to the contraction; for a hoof contracted generally, I framed a joint at the toe in the old way. When the heels only were drawn in, a joint was made opposite each quarter: and when the inner heel only was affected, I used one with a joint on that side only. These joints were not operated on by the former clumsy method of either sliding bars or heel-screws across the foot; but by small screws within the body of the shoe, that acted as levers, and forced one limb of the shoe from the other: each heel had also a *clip* to embrace the bars. With these shoes I have frequently extended contracted feet, and in many cases, in conjunction with thinning and moisture, their use was marked and considerable: but they, in common with all other expanding shoes, are but partial and temporary only in their benefits: their removal, particularly when added to, by a re-application of the constitutional or occasional causes, even in a slight degree only, is too apt to be followed by a return of the evil, and I have observed that the recurrence is more frequent after mechanical expansion by the means of shoes, than after any other of the plans in use.

Other means have also been used for the cure of this complaint, but with very limited success;—such as dividing the heels their whole length; taking up the pastern arteries; and lately taking up the pastern nerves has been tried as a remedy also. Firing and blistering have been employed often, as might be expected, and immersing in cold and in hot water, and in medicated waters, has been used in various ways to the fullest extent; and as the deprivation of moisture is one of the great causes of contraction, and the presence of moisture one of the great preventives of it, so it is not to be wondered if the foot bath flattered the hopes, and gave actual indications of amendment in many instances; some of which received permanent enlargement, while most were benefitted no longer than it was applied. Turning out at night, or even in the day, where there was moisture, has been fully tried, and, so long as moisture was present on the ground, did good; but as soon as it became dry and hard, and as a vertical sun increased the temperature of the earth, the contraction and lameness increased even. Permanent benefit being so seldom received from these means, occasioned attempts to be made both to enlarge the horny circle by a partial and by an extensive removal of the old horn, in hopes that the newly secreted horn would form of its original dimensions. To this end, experimentalists have lessened the resistance of the envelopment by numerous deep scores around, operating as so many hinges, on which the hoof, yielding to the pressure of the internal parts, has certainly expanded. To this was sometimes added a thinning of the hoof generally: but very seldom were the heels lowered or the sole divested of its inordinate increase, so that only half the proper benefit was derived. When Mr. Coleman began his career, he adopted and amended this plan; and, by his recommendation, it became more known and practised than it had heretofore been. I also had already made some trials of it; but at that time I preferred the quicker though less permanent mode of the expanding shoe, assisted by moisture, which I tried to its fullest extent, having at one time eight horses under my care, with each a separate process for expansion: subsequent experience and fresh experiments taught me to depend more on what may be called a *natural* and *voluntary* expansion of the hoof, in contradistinction to that produced by expanding shoes, which may be termed the *mechanical* and *forced* enlargement of it. By the spontaneous growth a more lasting effect is certainly gained; for the parts are themselves brought, not so much to enlarge the materials of the old hoof, as to form almost a new one; and which, if the former disposing causes of contraction be avoided, will, as being a new formation, be less subject to deterioration. Candour, however, forces me to observe, that benefit of a *very marked kind* does not remain permanent in a great many cases: occasionally, however, it does, of which I have seen some very complete instances[*]; and, therefore, though the general practice of it be not new, the full detail of it, I am persuaded, is so; for hitherto this method of removing contraction has been hardly more than hinted at; and of all the means in use for expanding the contracted foot, I think this decidedly the best, though the least tried. By a removal of such portions of offending horn as can be spared, a considerable part of the pressure of the contracted hoof is at once lessened, and the parts within enter on the process of forming an enlarged circle of horn, which sufficiently shews the beneficial tendency of such a proceeding. And it is upon a removal of the horn in such a way as to lessen the pressure of the contraction as much as possible, without weakening the support of the hoof, that the nicety of this operation depends. The mode of doing this will be, to take away such portions as can be best spared, and yet such as are the principal agents in the injury, which are the walls of the heels, and the inordinate increase of the sole; for experience has fully proved, that a thickened state of the sole, instead of affording a support to a tender foot, is the most painful addition that can be made to it. To render the performance of *this useful operation* easy and intelligible, I have added a figure representing a hoof so operated on, and which, with the following directions, will readily enable any intelligent smith to perform it. It should, however, be premised, that, when bad thrushes exist, it is proved that they should be first removed before the full extent of the operation is proceeded on; but, if the wiring-in of the heels is clearly the cause of the thrush, proceed to thin the heels without too much lowering them, but sufficiently to bring the lessened frog into the line of ground pressure. Treat afterwards as directed under *Thrushes*, and, when an evident amendment appears, proceed to complete the whole of what is intended.

Expanding process.—First, let the *sole* be carefully pared. I have already stated that the usual increase of horn here greatly aggravates the painful affection; so much so, that I have frequently afforded instant relief by merely thinning the sole. At no time can a horse, at all affected in his feet by contraction, step with even tolerable ease without his soles are thin. Having, therefore, pared the sole all over equally, until the thumb, by a firm pressure, is able to make it yield, proceed to lower the crust generally, correspondent with a proper line of the sole; but lower the heels as much as they can bear, without depriving them of all their horny covering, or reducing them too much beyond the general level, to the straining of the flexor tendons. In this paring, clear away the horn within the angle of the bars, and along the whole line; but leave the bars themselves sound and full. Do the same by the frog, leaving it as large as possible to relieve the weakened heels, clearing away only the ragged parts, unless it be thrushy, when all pressing and decayed portions, and all *underrunnings*, must be cut out clear. Having finished the under surface, proceed to rasp the walls or sides of the hoof, beginning about the middle of the quarter, and rasping it to the heel. I have found it, however, useful first to draw a line nearly or quite around the hoof, immediately under the coronary ring, marked *a a a* in the *fig.* p. 520. This line should be made as near the sensible part as possible, yet it must by no means touch or wound it; and in doing this the horse's feelings will in general be a pretty sure guide, for, as the rasp approaches near the vascular portion, he will flinch considerably. The line proves a direction to the rasping, which should be carried close to it from the beginning of the quarters *about c* in the *fig.* to the heels, doing it lightly at first, as may be seen *by b* in the *fig.*, but deepening the rasping as it approaches the heels, so as to remove the substance of the horn in a progressive thickness from the quarters to the heels, rasping the whole surface uniformly from the coronet downwards, leaving towards the heels a covering of horn of only an eighth of an inch in thickness, or in fact so much only as the thumb-nail can indent by a firm pressure, carefully however avoiding to go too deep, so as to wound the sensible parts underneath. To avoid this danger, as well as to leave the coronary ring distinct, and free from the pressure of any more of the contracted horn than is necessary simply to cover it, the operation should be finished with a small drawing knife, by which all the hard horn can be removed from parts where the rasp would be inconvenient, particularly towards the heels, where the thinning should be carried back quite to the inflexions (vide *posterior c* in the *fig.*). The coronary ring should be left quite distinct by a clean angular removal of horn, as seen at *b* in the *fig.*; and upon a regular thinning from above downwards of the whole of the horny portion covering the lateral parts of the heels, except the thin lamella of covering we have directed, depends the perfection of the operation. I have endeavoured to make it understood that the rasping having commenced at the *black c* in the *fig.* is there to be lightly done, and a moderate portion of horn only removed, increasing the quantity as the rasping proceeds, till, having reached the centre of the quarters, it is then to be removed to the prescribed thinness. When finished, the hoof will present exactly the appearance depicted in the following figure.

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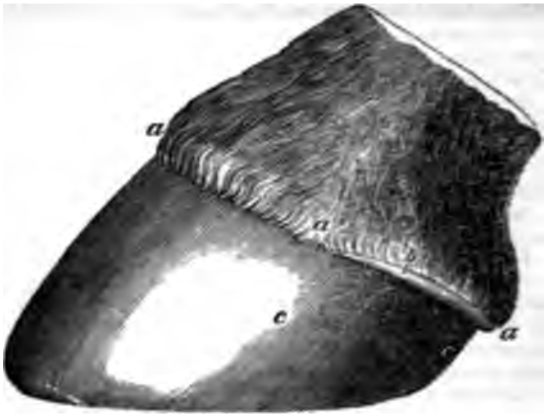
[*] I bought a gig horse of eight years old, with much lameness from contraction; the consequence, as I presumed, of hard work, stable confinement, &c. When I bought him, he could not travel ten miles without much difficulty, faltering at every step: a dealer would have called him '*dead lame*.' I submitted him to the process described, and turned him out to straw-yard for six months, occasionally inspecting him and rasping his feet anew. I then took him up, got him into condition; and though I do not say that he ever went exactly as a young fresh horse, he was sound for all purposes of draught work, for he was perfectly safe, willing, and nearly as well after thirty miles driving as in the morning at starting; and was again ready for exertion the next day. I drove him more than three years; and when he left me, although he did not go equally well as at first, he was then much better than when I bought him.



When there is a very great thickness of horn, I usually also rasp the whole circumference of the hoof moderately, so as a little to lessen the general resistance without weakening the foot, which should be carefully avoided. To favour the further expansion, let the foot now be taken in front, and a line of rasping be carried from above downwards to a moderate thinness; not however so thin as at the heels, which would weaken the foot too much. This front rasping should not be more than an inch over, and its intention will explain itself; for as the centre of *general* resistance to expansion must be here, and as even though the heels should be principally affected, yet there is usually also some lessening of the whole circumference, so the resistance to its expansion is by this front hinge materially decreased; and of so much importance is this, that I have also practised it as a preventive at every shoeing with manifest advantage. When the inner quarter only is affected with contraction, the rasping may be performed on that only; it will be very seldom, however, but some '*wiring in*' of the outer quarter also may be observed. It is evident that the above mode, performed exactly as here laid down, is principally calculated for the benefit of such feet as are contracted at the heels, with but a small lessening of the general circumference of the hoof. But there are cases in which the horny box is contracted *generally;* in such instances I have still rasped the heels, but not quite so deeply; nor have I carried the rasping so far forwards, but I have instead added three additional hinges to each side, by means of the old method of *scores* made in the hoof with a fine drawing-knife. These scores should be narrow and of a moderate depth; the strongest hoofs will allow of rather more than a quarter of an inch with perfect safety, and the weakest more than an eighth. One of these scores may be made a little within the heel side of the anterior letter *c;* the next a little beyond the toe side of the same letter; and the third between that and the front of the foot, where another ought to be placed. Having finished the operation thus far, put on a tip or tips with four or five nails only to each, and these towards the toe. To complete the process, if the heat and lameness were considerable before the operation, blister round the coronet, which greatly encourages the growth of new horn, and also tends to remove any mischief that the contraction may have occasioned.

The future management must depend on circumstances, and on the convenience of the owner. One thing, however, is indispensable, which is the application of moisture to lessen the remaining resistance, and thereby assist the expansion, as well as to promote the future growth of the horn. The best means of applying this moisture is to turn out to grass; but unless this be done where the situation is wet, less benefit will be derived. A dry pasture in a hot summer without rain would be injurious instead of beneficial; and a moist meadow, salt marsh, or one wherein is a pond to occasionally wet the feet, should be chosen. When thrushes exist, they need be no impediment to the turning out; but in such cases it is requisite that the horse be taken up every other day, and the thrushes dressed until they heal up. Care should be taken that the tips do not come off unperceived, and the horse remain without them. Every three weeks the sole should be carefully thinned, at which time the old horn may be slightly rasped again, and the line of separation between the old and new rendered distinct and angular as at first. If also the bulbous prominence of the new horn should be very high, thin it a very little by means of the rasp, to prevent internal pressure. In about three months the new horn will first reach the heels, and become opposed to the ground, at which time, if the horse be much wanted, he may be taken up, and may be *gently* worked in *bar shoes;* but if he can be suffered to remain longer without work, it will be advantageous. The whole of the appearances occasioned by the rasping will not be effaced in less than six months. When turning out is impracticable, it becomes a consideration as to the best mode of keeping the feet moist in the stable; and innumerable have been the contrivances for this purpose. Boots of all kinds, some containing sponge, some to be filled with poultice, &c. have been invented; but they prove so inconvenient, that they are seldom retained long in use. I have, however, seen some cased with small iron plates with hinges that answered the end tolerably. Standing in clay is a common plan, and, provided the horse stands level, it is not an inconvenient one; but often the paving of the stable is pulled up under the fore feet, and the poor animal is tortured by resting the lame limbs on a *descent.* On the other hand, I have seen him *mounted* up in a wooden trough, where much force was required to bring him into it. The best mode certainly is to cover the floor of a loose box with dung, mould, or clay, moistened so as to allow the wet mass to reach over the coronet. In this the horse can move about during the day, and may be removed at night to a stable, having the moisture still continued by means of wet cloths around the feet; and which cloths, when other means of moisture cannot be resorted to, may be wholly depended on. Two circles of thick woollen cloth, doubled over a tape within, will form a convenient apparatus, which tied (not tightly) around the pastern will adapt itself to the shape of the foot, and, being dipped in water two or three times a-day, will keep it wet: or any of the numerous contrivances now in vogue may be tried; it would seem like teaching a, b, c, to note them. If moisture be duly supplied, the coronary ring will expand, and the new horn will proceed downwards in a large bulbous expansion: the heels also will widen, and this faster than the frog is able to keep pace with them, seeing its growth in these cases is generally slow. This will leave a hollowness and excavated appearance which it will take some time to fill up: and when this exists in a very considerable degree, I have considered it as a mark that the reproduction of horn is not entirely free from disease, and that the benefits resulting from it will either be not great, or will not last. I have so much insisted on the occasional causes of contraction, that it would seem now unnecessary to reiterate, that, to make the benefits of the expanding process perfect, they must be carefully avoided in future. To a cool stable it would be well to add the benefits of a plane pavement, instead of a pebbled flooring: the stones should be grooved, to prevent slipping. The jointed, or the side-nailing process of shoeing, either of them could be tried; and it would greatly tend to prevent a recurrence of the contraction, were uniform pressure kept on the whole inferior surface of the foot. Mr. Cherry's elastic pads are calculated to do this; or stoppings could be applied: but I should by all means dissuade from the use of clay or whatever became dry and hard for the purpose; but any firm matter which would retain some plasticity would be a valuable acquisition towards this intention. It remains to add, that, although *neurotomy* does seldom prove a *remedy* for chronic founder, it will prove a valuable palliative for it, and particularly for incurable cases; and when, therefore, an owner has a chronic foundered horse, or one with any other of those foot affections which injure by the great sensibility they produce, it would be prudent to resort to neurotomy, which see: bearing in mind, that, if it be practised while any marks of active inflammation are going on, which will be apparent by the extra heat in the part, the hoofs may wholly separate from the feet.

THE PUMICED FOOT.

As this is a very common effect of both acute and chronic founder, an account of it very properly follows those affections. Pumiced feet are in every instance the effect of inflammation; but the vascular increase may be an acute or a chronic one. When the effect of the former, the alteration in the form of the foot is sudden, and is brought about in the manner described when treating on that disease. But when it is produced by a slow chronic inflammation, its attack is much more insidious and slow: the front of the hoof is first observed to fall in, and the sole to become nearly flat; at which time the horse begins to falter, and is sometimes very lame; at others he can move moderately well. The foot, when shod, generally presents no acquisition of horn; on the contrary, the sole becomes thinner and thinner, and at last bulges out into a surface more or less convex as the internal derangement is greater or less. The large wide feet of the native horses of moist counties are most prone to this evil, not being able to resist the weakening and irritating effect of battering on stony roads, and least of all on the pavement of the streets of London and other cities. Any kind of feet, however, may take on the affection after acute founder. The laminæ seem first to become affected, and lose their elasticity and power of support to the coffin-bone: their vascularity appears also excited, not in the secretion of horn, but of a considerable quantity of a diseased substance, which, with the weakened structure of these supports, displaces the coffin-bone, drawing the crust with it, and greatly increasing the natural obliquity of the hoof. The pressure that the displaced coffin-bone makes on the fleshy sole, occasions sometimes an absorption of its own edges, but always an interruption to the healthy secretion of horn, which accounts for the diminished thickness of the sole before noticed. The sole, therefore, being unable to resist the superincumbent weight, loses its concavity, and, yielding to the altered form of the parts above it, bulges into convexity. The whole of the parts within likewise become deranged in structure as well as situation: a large quantity of hardened matter, between the nature of horn and coagulable lymph, occupies the space in front left by the recession of the coffin-bone, which now approaches the heels, and rests there in an altered line of declivity.

The *treatment* of these feet can be only *palliative*, as a removal of the deformity has, I believe, never taken place. I have experienced some benefit from blistering the coronets in early cases, which has stimulated the foot to an increased secretion of horn. Every means must be taken to avoid outer pressure on the sole, which is not only painful, but actually aggravates the disease; and if sufficient rest were now and then allowed in these cases for the crust to grow level with the sole, such horses might be rendered useful; but instead of this, it is too often permitted to wear away by repeated shoeings, until the sole is exposed, and becomes tender, and unable to bear the most ordinary pressure. Pumiced feet should not be kept too moist, nor can they ever be cured by turning out without shoes, though I once thought differently; but they may be very properly dressed every day, both sole and walls, with a mixture of tar and oil, which proves extremely beneficial to them. The *shoe* in use for these feet is sufficiently known, being framed with a very wide web, and either made so thick as to allow of being bevelled away on the inner surface, to receive the convexity of the sole without pressing on it, or otherwise cockelled generally to the shape. But lately a different mode has been practised by some persons, and strongly recommended, which is to apply a shoe so narrow in the web as to cover the crust only, but of sufficient thickness to elevate the sole above the chance of pressure from the ground. This shoe is said to obviate the ill effects of stones, gravel, &c., getting under the wide webbed shoe, which sometimes lamed the horse; and it is said that pumiced horses even go best in these kind of shoes. I have, however, no experience of my own to offer with regard to them;

but, as it has been so stated with confidence, there can be therefore no objection to their trial, though, reasoning from analogy, I should be disposed to depend principally on the older method, which, if judiciously managed, will render such feet very useful. In some cases, no shoe answers so well as a strong bar shoe.

DISEASE OF THE NAVICULAR JOINT.

Groggy lameness is the term by which this affection has been principally known to farriers and horsemen, and which, like many other names, served to characterise many evils of doubtful nature and situation. If a lame horse exhibited no appearance whatever of altered structure, he was then shoulder-strained; but when other circumstances led to a conviction that the lower joints, somehow or other, were the seat of the evil, then the horse was groggy, or, at best, he had coffin-joint lameness: when contraction was apparent, the horse was said to be foundered. The study of morbid anatomy crept slowly among us; but although its light was at first feeble, yet some dim rays, by shewing that disease of the connexions of what was known as the shuttle-bone did often exist in cases of concealed lamenesses, lit up suspicion in the minds of some observers that here might originate and here might be found the grand cause of these occult cases of lameness; and it is but due to Mr. J. Turner to state, that, by his ample and scientific investigations, these suspicions have been matured into certainty, and the navicular joint disease is now united with his name by a kind of patent right: and if, unfortunately, we have little hope of finding an efficient remedy for it, we at least do not grope in the dark, and torment sound parts, to the anguish of the animal and the demonstration of our own ignorance. It must not, however, be supposed that we have arrived at the end of our journey; we are, in fact, but just entered on it: at present we are hugging a discovery too closely to admit any competitors; but we must not omit other diseased affections, which have also their probable share in these cases. I do not make this observation to lessen the value of this discovery, as it really may be called; but, being old in the world of discoveries, I would offer a caution against too confined a view of foot lameness, by considering every occult affection as navicular; and particularly from viewing every case of contraction with lameness as a disease of the navicular joint. This latter conclusion would lead into considerable practical error: on the other hand, I do not attempt to deny that this disease, by the irritation and heat it must keep up within the foot, may and does, without doubt, encourage contraction, and which is known by its not appearing in some cases until tenderness in progression has been some time apparent. By a reference to *Plate* 9 and its description, we shall find the perforans tendon, in its passage towards the bottom of the foot, making an angle to reach that insertion; within which angle is included the navicular or shuttle-bone. It requires but a very little examination to be convinced that this placing is for important purposes connected with this tendon, and which purpose a mechanician would, at once, own to be, by placing the tendon further from the centre of motion, to greatly increase its flexing power over the limb. The connexion between these parts is at once free, but very strong; opposite qualities, but here admirably combined, by the extent and power of the connecting ligaments, and by the furnishing the polished articulary surfaces with a synovial cavity filled with slippery glair. When we regard all this, we see the most admirable, but at the same time a necessarily complex organization; and consequently we can but be struck with the aptitude, that parts so formed as antagonists to each other, when subjected to inordinate concussion, either in its intensity or duration, should have to become diseased.

The *causes* of the affection may be *remote*, or they may be *proximate*. They cannot be strictly called hereditary or congenital with so much propriety as those of chronic founder, unless we consider this as a variety of founder: the tendency may, however, exist from birth in such horses as have very upright pasterns, where the rectilinear position of the bones must increase the shock of concussion. Pressure and concussion are, in most cases, the remote causes; contraction may also operate: the proximate is found in inflammation, ulceration, and occasionally some ossific deposit[*]. Mr. Turner lays much stress on contraction as a cause, which acts by forcing the frog upwards in the hollowed arch of such feet, thereby pressing injuriously on the navicular bone and its connexions: other writers, without denying that some displacement is occasionally found of the navicular bone, are not willing to acknowledge this as a common or very active cause. It is probable that, as an individual affection, it always originates within the ligamentous connexions of the navicular coffin-bones with the flexor tendons, which communicating with the synovial capsule, an altered secretion follows, by which the motions of this joint must be impeded from the want of the lubricating medium: friction ensues, the cartilaginous surfaces become absorbed, and a slow ulcerative process is the consequence, which, if suffered to go untreated, or that the animal continues to be hard-worked, ends in anchylosis[†].

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[*] Mr. Turner, however, limits ossification to a very few cases, and, except in extreme ones, he confines the general extent of affection to a very small space; and in many cases I believe it is so, but certainly it is more diffused in many others. 'With regard,' says Mr. T. 'to ossification of the cartilages of the foot, and ossification of portions of the ligaments of the navicular bone, and other bony excrescences within the foot, I have to remark, that, having dissected so many extreme cases of chronic foot lameness of many years' standing, in which I have found all the ravages of this disease limited to a space within the foot not exceeding half an inch square, and unaccompanied with the slightest disease of any other part of the internal foot, I am induced to consider them as mere effects arising out of navicular disease; and more particularly, as there are far more groggy feet without the slightest ossification of the ligaments of the navicular bone than with them. In short, I think those who have called the navicular disease an ossification of the joint, have erred very much; for it is any thing but an excrescence or exostosis, a great loss or absorption of bone being, in fact, the malady, yet I must acknowledge that I have occasionally seen, in recent cases, a few small eminences on the inferior surface of the centre bone, about the size of millet seeds; but, in the progress of the disease, not only would they have been absorbed by friction, but that portion of bone itself on which they appear would also have been carried away by ulceration.'

[†] Professor Dick appears to consider contraction and navicular disease as branches from the same root. He is of opinion that whatever establishes heat and inflammation in the foot, as unequal pressure of the shoe-heels, a stone fixed in the foot, too tight nailing of the shoes, &c., in fact, 'any *immediate exciting cause* of contraction, may cause a continuation and extension of the inflammation, involving, among other parts, the synovial capsule between the flexor tendon and navicular bone.' And such, he adds, is most likely to happen 'when the foot has already suffered from any of the predisposing causes before enumerated' (these were the gradual effects produced by shoeing, improper paring, artificial treatment in the stable, heat of litter, want of stopping, confinement in the stall, and peculiar formation in the limbs). Another of these predisposing causes to these joint affections of the feet, Mr. Dick attributes to strains. 'What,' he says, 'is the cause of the diseases (windgalls, &c.) which occur in the synovial capsules, the fetlocks, knee joints, and hocks? what but sudden strain, or long-continued exertion of the tendons and ligaments of these parts? If the idea is not too mechanical, I may observe that the continued action produces friction between the parts, from a deficiency or change in the joint oil, similar to what takes place under like circumstances in any machinery, and similar to what is frequently met with in the hock joints, where the cartilage becomes at times either partially or wholly worn off by friction, and the bones take on a hard polished surface similar in appearance to enamel, of which I have a number of specimens. The consequence of such friction is (heat), inflammation with an altered state of the secretions. This is materially augmented by the action of the part, which, from its relative position, is constantly, while the animal is erect or in motion, supporting a considerable degree of pressure, and, by the depth of its situation, little advantage can be derived from the application of remedies. Inflammation once excited in a cartilage or bone, or in the membranes surrounding them, is generally followed by a deposition of bony matter, as, for example, in splints, sprains, ossified lateral cartilages, &c. Thus it is ossific spicula are deposited on the cartilage on the under surface of the navicular bone, which goes on frequently until the whole of this surface is materially altered by new bony matter being deposited. The motion and play of the tendon for a time keep up the inflamed action of the bone (which is shewn by the discolouration observable upon it), till, at length, the continued irritation of such friction excites the action of the absorbents, and they, by absorption of a portion of the bone, produce an ulcerated surface, similar to a carious tooth. The ragged surface thus produced now acts upon the tendon, the inflammation is increased, and lymph is effused to allay, as it were, the irritation on both surfaces. As the lameness must now be extreme, rest is given, during which, adhesive inflammation unites both surfaces together. In other cases, the ulcerated surface of the bone lacerates the tendon, and small shreds are found, on dissection, attached to its surface, while others are found connecting it to the bone. And this ulcerated surface, in old or severe cases, is frequently so extensive, that after the nerves have been divided (an operation frequently performed to relieve the animal), and the animal enabled, by the foot being deprived of sensation, to use it with greater freedom, the friction completely divides the tendon, and the pastern falls to the ground. In those cases in which the disease depends upon injury occurring first in the joint itself, the inflammation is not always confined to that particular part, but generally spreads throughout the rest of the foot, producing similar effects as that already described, such as arise from pinching with the nails, or from a bruise with the heel of the shoe, which, by the action and re-action which take place, produces a degree of contraction in the hoof similar to what occurs from the more superficial causes already mentioned. Hence it will be seen that the navicular disease (grogginess) may be either a cause or an effect of contraction. There are cases, however, in which, either from the slight degree of injury, the treatment adopted, or the

The *symptoms* are few, but anomalous, according to the degree of the affection, &c. It is principally distinguished from chronic founder by the horse seldom pointing his foot, as in that disease; there is, however, usually a more elevated direction of the pastern, acquired by efforts to avoid compressing the articulary surfaces in connexion with the navicular bone, the under surface of which is commonly affected with ulceration. The groggy horse does not falter altogether like the foundered horse; the latter appears to suffer most pain when he strikes his toe into the ground, which he is apt to do: he goes as is expressed, as though his feet were benumbed, until awakened into sensibility by some uneven surface. The groggy horse lifts up his feet with constant sensibility, and is ever fearful of extending his action, but suffers less from uneven surfaces; and his heels are always hot.

The *treatment*, unfortunately, must begin very early, to be successful; and it is seldom that the practitioner is called in until disorganization has proceeded too far for permanent benefit. If contraction is apparent, treat as directed; and, provided inflammation of an active kind be present, and is known by the heat of the part and the shifting of position, bleed by the toe, otherwise blister the heels; for it is seldom but that both fore feet are affected, but never the hind. Thin the crust around, and particularly the sole, and, after the second blister, insert a seton, according to the College practice, through the fleshy, or, as it is called, the fatty frog. It will, in bad cases, somewhat stay the ulcerative process, and always ease the suffering animal in progression, as well as give liberty in action, provided neurotomy be performed, but which should not be attempted while any active symptoms of inflammation remain.

CORNS;

So named, I presume, from the disease of the cutis of the human foot. Corns, both in man and horse, certainly arise from pressure, but farther than this the analogy fails: in ourselves, the cuticle is usually increased; in the horse it is ever after decreased. A corn is the consequence of undue pressure applied to that part of the horny sole which fills up the angle of the inflections of the heels, i. e., that which is between the outer crust and the bars. When violent pressure becomes applied, even for a short time, it produces inflammation and extravasation; when the pressure is less violent, but long continued, inflammation and extravasation equally result in the vascular secreting sole, whose vessels becoming ruptured, pour out a sanguineous fluid, which makes a fresh corn present a bloody spot. This vascular secreting portion of sensible sole, when once injured in this way, unless immediately relieved and not again subjected to any pressure whatever, until it be perfectly reinstated, takes on a permanently diseased state, and ever after, instead of perfect horn, a morbid secretion of a thin semi-corneous, and in some of a semi-purulent matter, fills up the place, the inflamed vessels always retaining an exquisite sensibility. It is to this that the incurable nature and the great tenderness of corns when pressed on is owing. Corns have always a mechanical origin: pressure in some shape or other, acting either upon the outer horn of the heels or on the inner portion of the bars, or on the point of the inflected angle of the heel, is the cause, by its bruising the sensible vascular sole beneath, either by approximating the outer and inner horny portions of the heels, or by a direct perpendicular pressure of that part of the arch of the hoof which fills up the inflections. Corns are very common in contracted feet, from the falling or *wiring-in* of the walls of the heels; and as the inner walls and heels are weaker, and also as they bear a greater pressure of superincumbent weight, so we learn the reason why they are so much more frequently in the inner than the outer heel. It is to the superior strength of the heels behind, and likewise to the smaller degree

strength of the foot, this change in the appearance of the hoof does not take place so rapidly as in others, and in which it requires all the advantages of extensive experience and careful observation to detect: they appear groggy in their action, but the strength and open form of the feet deceives the inexperienced.'—*Quarterly Journal of Agriculture*, No. 6.

of pressure on them, that they are so generally exempt from corns. When the heels are suffered to grow too high, it is evident that undue pressure must take place within; and if contraction be added to this, the evil is inevitable; and this happens equally in the shod and unshod state. I have seen very bad corns contracted at grass, where horses were purposely unshod, but were turned out without paring, and suffered to remain without attention during a long dry summer. Too little horn also subjects the feet to corns, because a slight pressure will indent weak feet, which are notoriously subject to them. Of all the operating causes, the mechanical pressure derived from the shoes is the most common. Corns may come on even with good shoeing; but with bad shoeing they must be fortunate indeed which escape. The best shoe, suffered to remain on a foot too long, will produce a corn or corns: the bad shoe will produce them in various ways, but in none more certainly than when the heels are made thicker than the toe. Some country smiths make a thick clubbed end of the heels, or they put a calkin on the outer and a thickened clubbed end on the inner, without lowering the heels to receive the increase of iron. Here injurious pressure must occur at every step: pressure at rest, and pressure in moderate work; and violent concussions in quick progressions must be here inevitable. The custom also of making the seat of the shoe slant or bevel inwards, is, I believe, sometimes productive of corns, by forcing the crust to press on the sensible sole laterally. Neglecting to prepare the foot for the shoe is also a fruitful source of corns; for that part of the horny sole which fills up the acute angle between the crust and bars, the pressure on which is so injurious, is, in a state of nature, protected by the prominences of the frog and bars, as well as by the inclined direction of the latter; but as artificial habits alter the shape of the foot, this part becomes exposed; and, therefore, in preparing a foot for the shoe, this angular portion should be so pared as to remove it from contact with the iron, without weakening the horny covering of the sensible sole. For so surely as this part becomes subjected to pressure for any considerable length of time, so surely extravasation takes place, and a corn is formed, and this more quickly when the heels are weak. Another common cause is the neglect of removing or renewing the shoes at proper intervals: when a shoe has been long worn, the growth of the hoof carries it forwards, by which the parts originally opposed to the heels are carried beyond them, and now press on the sole, often becoming indented within the line of the crust, and producing a most injurious pressure. Sometimes, also, either from the original form of the shoes, or by long wear, they become loose and '*springy*' at the heels, as smiths call it; in which cases gravel is apt to make its way between the shoe and foot, and, by the pressure of the heels during action, is indented into the substance of the horn; other gravel becomes received in the same manner, which presses the first still onward, until at last it meets the sensible part: inflammation now ensues, which either extravasates pure blood and forms a corn, or it may proceed to suppuration, as when a prick is received, under which this consequence will be noticed. The more common effects of extraneous matters getting between the spongy heel and the shoe, or of the outer rim of the shoe getting within the rim of the crust of the heels (sometimes the whole heel of the shoe imbeds itself with the inflected heel generally), are as already noticed: the extravasation of a little blood, which, on paring away the horn at the angular point of the heel or heels, appears as a black or red speck, as the blood has been longer or more newly thrown out from its vessels; it may be followed with the paring knife to its source in the sensible part, which never after thoroughly heals, but remains in something the same state, producing a new extravasation on every slight reapplication of pressure: a thin coat of imperfect horn is thrown out over it, which itself proves a source of future irritation; and therefore horses with old corns only go well when fresh shod and newly pared; for as soon as the portion of sole between the bars grows to a level with the surrounding horn, the sensible sole receives a fresh bruise, and lameness again appears. It is by contemplating this possible termination of corn, that the law has wisely considered every horse with this complaint as unsound.

Treatment of Corns.—When a corn of moderate extent first appears, it is not difficult by proper means to remove it completely; but when it has existed some time, the injured parts become weakened, and the diseased action established. As soon, therefore, as it is discovered, the cure should be immediately attempted; first, by removing with a fine drawing-knife every portion of *diseased horn* around, and the whole of the extravasation likewise, avoiding, however, wounding the sensible sole underneath. Having done this, introduce some caustic liquid, as muriate of antimony, into the opening, which will act on the sensible sole by destroying the unsound parts, and by stimulating the remainder to a healthy secretion of horn. If any contraction of the heels be present, they should be slightly thinned to relieve the pressure; and, without this, it is probable a cure will be in vain hoped for. A shoe should be then applied, properly chambered opposite the weak part; or a bar shoe may be used, laid *off* the heel or heels, and taking its bearing on the frog. In a week's time, or less, the part will have gained sufficient strength, when the horse may be turned out; but, during this interval, introduce every other day a small pledget dipped in the escharotic liquid used, as muriate of antimony, a solution of lunar caustic, potash, &c. &c. (see *Caustics*, *Mat. Med.*) After the horse has been to grass a month or six weeks, if the meadow be tolerably moist, and the feet be naturally strong, remove the shoes, pare the horn lightly away from the seat of corn, not however sufficient to weaken the support, and then put on tips, if the feet be of the strong kind; but if it have taken place in heels naturally weak and low, continue the bar or chambered shoe. In this way corns may be *permanently cured* at their outset. But having become habitual and permanent, a *palliative* treatment only can be pursued. In the first place, the pressure of the horn must be guarded against by a regular and frequent paring out of that portion between the inflection of the heel; and if the hoof be very strong, and at all disposed to contract, the quarters also should be attended to, and not allowed to become too high or too thick. I have also in very strong feet found the use of a short shoe sometimes of the greatest service; but to a weak foot, either a chambered or a bar shoe is preferable: when the weakness is very considerable, or the corn a very bad one, a bar shoe is the most proper support, and should be constantly used; still more particularly remembering in these aggravated cases to remove occasionally all the surrounding horn likely to press on the injured part, at the same time taking care to let the frog rest on the bar of the shoe. And whenever such a horse is shod, it is proper for the corn to be dressed with some active stimulant, as the muriate of antimony, in some degree to counteract the morbid action, and to rouse the deadened part to a new one: by doing this regularly when shod, and about once a week also in the intermediate times, I have rendered horses, before useless, able afterwards to work with comfort to themselves and satisfaction to their owner. In slight cases of corn, the shoe proper to be used is one of rather more substance than common, with the web a little wider than usual, and its width equal throughout, that is, as wide at the heels as the toe; it should also extend rather farther back than it generally does, and present a perfectly level surface. This shoe will afford ease and protection: future pressure must be avoided by keeping the seat of corns clear from offending horn.

THRUSH.

SOME pains have been taken to trace the source from whence this unmeaning term arose. Two centuries ago it was called *running Frush;* and as, before that time, in some of the very old treatises on farriery, which borrowed much from the French, we find it named *running Fourche*, it seems to be probable that it really did take its name from fourche, the French term for the frog, gradually corrupted into its present appellation of *running thrush*. The complaint itself consists in a diseased action of the sensible frog, whereby, instead of secreting horn, it produces pus, which escapes out between the cleft of the horny frog. It is very improperly considered by many as a matter of trifling import; but a little experience only in the diseases of the feet will shew that it is by no means so harmless as supposed. Still more erroneous is it to assert that thrushes do good by drawing off humours, or that there can ever be any danger in stopping them. On the contrary, there probably never was a perfectly *harmless* thrush, or one that could exist long without doing some injury, by laying the foundation for contraction of the foot in which it existed, by the inflammation and heat excited in the parts around. Various proximate causes produce thrush; the remote one is always inflammation of the sensible sole. Contraction, though a very common origin, is by no means the only one, for we observe them frequently in the wide open feet of very young horses, in which cases they appear to originate much in the same way as swelled legs, &c., by accumulation, or a determination of blood to the feet, from general plethora, which, occasioning inflammation, thrushes form, and in which cases only can they be at all regarded as constitutional, or as possibly injurious if put a stop to suddenly. In many other instances their origin is to be traced to the application of moisture, particularly of *acrid* moisture, as that of dung, urine, &c., which, soaking the horny frog, at last penetrates it, and then becomes a source of irritation to the sensitive frog underneath. This effect of moisture accounts for the increased tendency of thrushes to affect the hinder feet in some instances, while the fore feet remain perfectly free from them. Contraction is notoriously a common cause of thrushes; but they are by no means necessary consequences of it, seeing many contracted feet are without them, though many more are with them; which is not difficult to account for, when we consider how likely it is that the inflammation accompanying painful contraction should extend itself to the vascular frog, not only by proximity, but also by the pressure it must occasion on the sensible frog. The different actions of secreting organs are here strikingly exemplified; the inflammation attendant on contraction stimulates the laminæ and the arched vault of the vascular sole to an extra secretion of horn; but inflammation applied to the vascular frog diminishes the secretion of horny frog:—are the inflammations themselves different? It is also remarkable, that although the contraction may be removed, it is not often that a *full* secretion of horny frog readily again takes place. As contraction is a very common cause of thrush, so it is equally certain that a long continued thrush is apt to end in contracting the foot; and which is one of the few instances in which a complaint may be both a cause and a consequence. Neither can any horse be considered *safe* that has a thrush, for there is always some degree of tenderness felt; and, in these cases, if the point of a sharp stone at any time should penetrate the cleft, or any of the sinuses occasioned by the complaint when considerable, he will sometimes come to the ground at once from excess of pain: but it is not often that this complaint produces any lameness in the general gait. The appearances of thrush are sufficiently known: at first a moist exudation only appears from the natural cleft of the frog; when it has existed some time the frog scales away, and is but partially renewed, but contracts, leaving numerous fissures: the ulceration extends to the sensitive sole throughout its whole surface; all the fissures of the horny frog now produce a purulent discharge of a peculiar fœtid smell; and such cases, if unattended to, particularly in the hinder feet, may degenerate into canker.

Treatment.—Thrushes may be in almost every case considered as a local complaint; and it is not only unlikely to do any harm by stopping them, but it is absolutely necessary in every instance to do so. In that kind we first noticed as sometimes taking place in the open feet of young horses, which, fresh from grass, become suddenly subjected to confinement, it will, however, remove all danger, and even perhaps assist the cure, if the plethora of the constitution be attended to, and this more particularly if they exist in the whole four feet; or that any such horse have exhibited symptoms of ophthalmia, in which latter case insert a seton or rowel; but in all other instances the treatment should be at once wholly applied to the affection. When thrushes are connected with a contracted state of the feet, it is evident that a removal of the irritating pressure of the walls of the hoof is necessary to a radical cure (see *Contraction*). When moisture has been the exciting cause, it should, of course, be carefully removed, and its occurrence again prevented, particularly that produced by decomposing dung and litter. But this caution must not operate as a means of denying the application of other moisture to the feet in ordinary cases, either as a prevention or as a cure of contraction: it is sufficiently easy when necessary, to guard the frog against the effects of wet, and yet to apply it to all other parts of the foot; for when all the fissures of the frog are dexterously stopped with tow, charged with some oily astringent mixture, no aqueous fluid will penetrate to the sensible sole. The present stoppage of thrush is seldom difficult, but to prevent its recurrence is not so easy always; for the parts having once taken on this action, readily fall into it again. Almost any astringent substance will check the early suppurative action of the vascular sole, as *compound tincture of Benjamin* (*Friars' balsam*), *tincture of myrrh*, *solutions of vitriol*, *alum*, *lead*, *&c.*, which may be either of them usefully applied for this purpose. Tar and salt mixed is also a good application, or tar and bole armenic: a solution of nitrate of silver is also recommended; but perhaps the following combinest he good properties of all in a very considerable degree:—

Ore of zinc (*prepared calamine*)	half an ounce
Subacetate of copper (*verdigris*)...............	ditto
Sulphate of zinc (*white vitriol*).................	one drachm
Tar	three ounces.

Mix.

Before the introduction of this, the frog should be inspected, and all the decayed hardened parts, concealing underrunnings and sinuses, removed; so that the introduction of the mixture may be facilitated, and the disposition to harbour filth and moisture prevented. The whole frog may then be very properly smeared over with the mixture; but, more particularly, a small piece of tow should be charged with it, and by means of a skewer, or other similar instrument, pressed to the bottom of the cleft of the frog, and also into every other fissure that may exist, as at the lateral parts where the frog joins the heels, where sinuses very commonly form in cases of bad thrush. Care should be taken, when introducing the tow, to do it neatly, so that no parts hang out, by which means the dressing will remain secure two or three days; but no application simply poured in, without the aid of some other substance, as tow, soft sponge, wool, or rag, which retains the application and guards against moisture, will answer so well. In bad cases the dressing should be repeated every day, in others every other day, or twice a week; but in all it is of import, as a guard, that the cleft should never be without the intermediate substance employed. When it becomes necessary to turn a horse out to grass with thrushes, and which is often the best means of cure, it is of consequence to remember that this treatment should be equally actively pursued during the time the horse remains out, otherwise the moisture applied will aggravate the evil; but if once a-day, or at least every other day, a pledget of soft sponge or tow, charged with the mixture, be introduced, so as to leave no hanging parts without, it will remain free from danger of escape, unless the frog should be in a very diseased state, in which case the tow should be fastened in with cross bars, as in canker; or a bar shoe may be put on, and the dressing applied under it. These precautions also are necessary when thrushes exist in feet operated on for contraction, and where the treatment requires continual moisture to the general horn, but the absence of it for the frog in particular.

SANDCRACK.

THIS is a solution of continuity between some of the horny fibres of the hoof, generally in a direction parallel to their growth; that is, from above downwards. Now and then, though but very seldom, these cracks exist in an horizontal position. The term *sandcrack* has been said to arise from the dirt or sand usually observed within the fissure, which is supposed to be its cause: but this is erroneous; for, absurd as are many of the names of diseases in the old nomenclature of farriery, this has a more significant origin: and is called *sandcrack*, because it was formerly supposed peculiar to hot *sandy* districts, the heat of which, applied to the feet, gave them a disposition to *crack* thus*. These fissures are more common to the fore than to the hind feet, not but that the latter are sometimes affected with them, particularly of cart and other heavy draught horses; in which cases they are generally observed in the front of the hoof, from the violent strain put on this part in drawing loads: in the fore feet they are more usually situated towards the inner and less frequently on the outer quarters: here, also, the weakness of the inner wall, and the increased weight thrown on it, acts, as in contraction, peculiarly disadvantageously to this side of the foot; sandcracks are, however, seen occasionally in the front of the fore feet. In every instance, where it is not occasioned by some outward injury to the hoof, it is, I believe, brought on by a brittle state of the horny fibres: sometimes it is constitutional, like brittle nails; at others, arising from the operation of the same causes which produce contraction, with which it is very nearly allied in origin; for it is not often observed but in such hoofs as have undergone some unfavourable alteration in form, in which the horn, having taken on a diseased brittleness, does not readily yield to the daily contraction of the walls, but some momentary application of force suddenly disunites a portion of its fibres. Whatever injures the vascular coronary origin of the hoof, as treads, cuts, or other lesions of the coronet, may also produce sandcrack. The fissure is not always of a determined depth, being sometimes so superficial as not to penetrate the whole thickness of the horn, and occasioning no inconvenience at first. At others, it exactly extends through the horn, but does not divide any of the sensible parts underneath: while, sometimes, again a lesion of some of these takes place: neglect, and a continuance of work will, however, commonly bring any case from the slightest into the most aggravated state. When the hoof is completely penetrated, it becomes a most painful affection, and productive of extreme lameness; for the divided edges of the horn are apt, during exercise, to admit the protrusion of the soft parts underneath; which becoming suddenly pressed on by the approximation of the horny edges, exquisite momentary pain is produced. From the injury done to the sensible laminated expansion, there is often a sprouting of fungus between the divided edges, which greatly aggravates the symptoms. Accidents of all kinds, injuring the vascular origin of the hoof around the coronet, may occasion a sandcrack also, as treads, stubs, &c.

Treatment.—A very different curative plan is proper to be pursued, according to the state in which the complaint may be found. The grand object must be, to interrupt the communication between the crack and the sound horn, otherwise it will extend itself; and when it occurs in a hoof evidently contracted and brittle, a radical removal of the evil will be best attempted by reducing the resistance of the horn, and by correcting its contractile tendency by the means recommended against contraction, such as a moderate thinning of the quarters, and the applications of *future* moisture, after the edges of the fissure have been brought completely together. Much difference of opinion has arisen as to the best mode of destroying the connexion between the divided and the sound horn. Some prefer the firing-iron, others the rasp. Mr. White's method is that of *firing* the fissure, by which '*a glue-like matter*,' the albuminous matter from the vessels of the horn, becomes an artificial and *temporary* bond of union until new horn be formed, and the opening closed by ultimate connexion. This plan of Mr. White's is not, I confess, the one I prefer, but I have seen it very successfully practised. When a sandcrack is the effect of injury done to the coronet, the rising edges of the horn must be reduced almost to the quick, and the whole of the surrounding portion must also be thinned. Here we must reduce a portion of the coronet to the same state with the lesion, by which one inflammatory process will unite the whole, and prevent an extension of the evil. Having done this, draw a line of sufficient depth, not to penetrate the quick, across the inferior limit of the crack, either with a drawing-knife, rasp, or firing-iron; which will prevent the further extension of the fissure. After this, bandage up; but should any inflammation remain in the original wound of the coronet, do not bandage tightly over that*. In the usual cases of sandcrack from a disjunction of horny fibres, the state of the opening must be first carefully attended to. When, either from pressure, the original depth of the injury, or when dirt has got into the wound and suppuration has taken place, were an attempt made at once to close and bind up the opening, very extensive mischief would be the consequence. Instead of this, the hard edges of the horn should be first removed, and the surrounding portions thinned considerably; after which, the opening should be dressed with any mild stimulant likely to encourage the adhesive inflammation, as a pledget of tincture of myrrh, with aloes, &c. &c.; and over this another thick pledget, spread with defensive ointment, may be placed; and if the irritation and inflammation are considerable, apply a poultice over all. In case of underrunnings and detachments of horn, the separated portions must be removed; but as this will seldom happen, the removal of more than the horny edges is not often necessary. In a few days, by repeating a similar mode of dressing, the dirt will be evacuated, and the parts will heal, harden, and become dry; when the process about to be recommended for common cases, without suppuration, may be proceeded on.

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* Hurtrel d'Arboval says that the horses transported from France to serve with the army in Egypt became most numerously affected with sandcracks, and with such as extended from the coronet to the bottom of the foot; and some had two or three of them on one foot.—See *art. Seimes, Dict. Vet.*

When a sandcrack has occurred, and which shews no signs of suppuration, although it have completely penetrated the horn, and a little blood or serous moisture shews itself at the edges, but only under the effects of motion, proceed to thin the hoof around it, and next, by means of a camel's hair pencil, introduce within the edges a small quantity of solution of lunar caustic, as ten grains to a drachm of water; or the chloride of antimony may be used, though I prefer the former. Bandage the hoof up moderately tight for two days, then again examine the fissure; when, if the oozing be altogether stopped, and no inflammation appear, proceed to draw a line of a moderate depth with a sharp firing-iron, a very little above the upper limit of the crack, and another just beyond the lower limit also, and afterwards bandage as directed below. If preferred, these lines of separation may be made with a rasp, or fine drawing-knife; but I have commonly chosen the iron, as I think the seared line of distinction stronger and more perfect than the rasped or cut one, and the agglutinizing flow binds the parts together better. But in case no moisture at all has appeared at the crack, and on examination with a probe it is clear that the fissure has not reached the vascular parts underneath, then the insertion of any caustic matter is unnecessary; the wasting two days for probable consequences is likewise equally so; and the *completion* of the treatment for the above state, and the *commencement* of the treatment for this, will be as follows:—

The horse being shod with a bar shoe, and the hoof either pared away in a line with the crack, or otherwise the shoe chambered, so that the hoof immediately under the fissure may not press at all on the shoe (in a strong hoof the former perhaps is proper, in a weak one the latter may be preferable), proceed to bandage up the foot, so as to fulfil the following intentions:—Bring the divided edges of the fissure together, and completely retain them there, in such a manner as totally to exclude moisture from entering the opening. Whatever mode will answer these purposes best should be adopted; perhaps the following, though a common one, is equal to any:—Melt some shoemakers' wax, and smear all over the hoof, and, before it is quite cold, bind upon the wax, neatly, evenly, and firmly, about three yards of tape, so as to include as much of the hoof as may be within the turns; fasten off with a hard knot, and again over the whole smear more wax, and, lastly, smooth it into an even surface. After all, rub over a little lard or other greasy substance, to prevent the pitchy matter from sticking. The horse may now be turned out, which will be particularly desirable; or, if to be kept in the stable, he may be exercised every day by walking in hand. It remains only to remark, that, as most of these cases take their origin from an altered condition of the hoof, so all the preventive means detailed under *Contraction* apply here after the recovery is completed.

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* These are among the worst cases of sandcrack, and, at best, require much time for the horn to grow fairly down. I should prefer firing as the medium of raising the adhesive inflammation: the iron should be a flat one, and much nicety is required in the requisite heat to be employed: it must, as before observed, reduce the fissure and the coronary continuous portions into one level, and into one common adhesive inflammation: too much would destroy the secreting surface altogether; too little would leave the breach unrepaired, and the future growth of horn interrupted. As soon as the horny growth is established, turn out the horse to grass.

PUNCTURED FOOT, OR PRICK.

The under surface of the horny covering of the foot is unavoidably exposed to numberless injuries from sharp bodies penetrating its substance, which may happen in various ways, from nails, pointed flints, glass, &c. The shoe being partly torn off, and then stepped upon, may produce it; but the accidental puncture by a nail during shoeing is one of the most frequent causes of these accidents. Injuries of this kind are proportioned in their effects according to the parts punctured, and not entirely to the depth of the wound: a knowledge, therefore, of the anatomical structure of the foot is necessary to enable us to form a prognosis, as well as to establish a proper method of cure. A puncture through the fleshy frog, even to the vascular portion, is not productive usually of such serious consequences as an apparently more superficial opening made through the centre of the sole, which may penetrate the capsular ligament, and either produce anchylosis or destroy the animal. Whenever a puncture takes place of sufficient depth to penetrate to the bony connexions (which may be ascertained by examination with a probe), and synovia escapes, the *external* opening should be enlarged: but it should be attempted to close the *internal* opening at once, by the application of the actual cautery, not to the immediate surface of the capsular ligament, but to the skin directly over it. If, however, this treatment has been neglected, and suppuration has actually taken place, the cautery should be omitted: but an adhesive inflammation may be attempted in the part, by the application of milder stimulants introduced by means of a brush: as muriate of antimony diluted with oil may be lightly pencilled over the outer edges of the capsular orifice, on which may be placed a pledget moistened with tincture of myrrh, or tincture of benjamin, &c.; and any mild digestive may be laid over all as a defence. If the inflammation be considerable, bleed at the toe, and imbed the whole foot in a poultice. A very deep posterior puncture may extend itself into the flexor tendon or its sheath, and is always productive of very great irritation and inflammation. In such case enlarge the opening, and if the wound be seen immediately after the accident, introduce any very mild stimulant, as the warm tinctures: but if the accident have occurred a day or two, and the inflammation be considerable, bleed at the toe, and place the foot in a saturnine poultice. When suppuration comes on, watch its progress, moderate the inflammation, give a free exit to the matter, and carefully remove the horn that becomes detached at each dressing, at least so much as to prevent concealment of the mischief, or as likely to encourage sinuses to form. And as the life of these tendinous parts is inconsiderable, at each dressing a little of any of the above warm spirituous applications may be introduced, which will assist the healing, or, if a sloughing of any portion be unavoidable, will tend to assist its separation. A puncture of the sensible sole must be treated in a similar manner, remembering, in every instance, that *caustic* or *highly* stimulating liquids should never be introduced, as is often done, except under particular circumstances, which will be noticed. The introduction of tincture of myrrh, tincture of benjamin, or a mild solution of white vitriol, &c., at the moment of the accident, is admissible, because it may gently stimulate the part to the adhesive inflammation; and if even suppuration be inevitable, the mildness of such applications cannot aggravate the process.

But the most usual cases of punctures are those which arise from a wrong direction of a nail in shoeing, in which it either presses on or actually wounds the sensible laminæ. This is commonly known to the workman at the time by a peculiar sensation arising from the different resistance occasioned; or otherwise is detected by the flinching of the horse; when, if the nail be immediately removed, no ill consequences follow, unless the injury be considerable; and even in this case, were but a little common honesty practised, the serious evils that frequently follow these punctures might be prevented. Were the nail immediately redrawn, the opening enlarged, and a little spirituous balsam of any kind introduced, it would commonly heal directly after; and even should it proceed to suppuration, still a depending orifice would be made for the evacuation of the matter, and the extensive detachment of horn prevented. But when a smith, in shoeing, considers the horse not actually *pricked*, though he may be conscious that the nail has taken a wrong direction, or is driven too high, he is apt, from laziness, to let it remain; but he ought to be aware that a slight bulge is made, which occasions pressure on the vascular parts within, and inflammation will surely follow if it remain. It does happen that, even when he is aware that the nail has penetrated the inner surface of the horn, and wounded the vascular parts, he is often then not sufficiently candid to acknowledge it. The offending nail being allowed to remain, according to the extent of the injury, the inflammation becomes considerable the same night, or perhaps not till two or three days after. In such cases, as suppuration proceeds, the confined matter spreads around, detaching a portion of the fleshy from the horny sole, more or less considerable; and, at last extending upwards, it finds itself an exit by an opening at the coronet. In proceeding this course, the inflammation does not always confine itself to the parts nearest the exterior surface, as the punctured portion and sensible laminæ; but often, when not assisted by an artificial opening, it extends to parts less vascular, and whose action not being of that nature to make them immediately throw off the injury by forcing the matter outwards (as is done by parts more vascular), sinuses form inwards, and the disease then becomes *quittor*. Fortunately, however, the vascular action of the sensitive sole and laminæ being extreme, the matter usually proceeds outwards, and finds an exit at the coronet.

It may, therefore, in pursuing this subject, be stated, that at any time when a horse becomes lame within a week after he has been shod, if the origin of it be hid in any obscurity, the shoe should be always first removed, and the foot gently struck all over with taps of the hammer. If the lameness springs from this source, and any part be injured by one nail in particular, at that part the stroke will occasion the horse to flinch. If this fail to detect the evil, pinch the toe and quarter round with the pincers, which, if the mischief arise from a prick, will readily point out the affected part by the pain felt there; and under this spot matter will have surely formed. Proceed in such case immediately to pare away the horny sole till it be very thin, when on close inspection, if the paring be made within two or three days from the prick, a dark-coloured fluid will ooze from one of the nail holes, but, if a longer period has elapsed, a purulent one will appear; and if the suppuration be limited to the mere puncture only, apply a pledget of compound tincture of benjamin; tack on the shoe, and inclose the foot in a poultice if there be much heat and tenderness; if but little, wrap it externally round with wet cloths only. Examine it the next day, and, if the oozing is left, repeat the tincture; again tack on the shoe, and by the morrow all will be well probably. But should a longer time have elapsed, and there is an appearance of extensive suppuration, we must not content ourselves with merely evacuating the purulent matter, but must extend the opening, and then carefully examine the extent of the injury by the probe, as how far the fleshy and horny soles have become separated from each other, for to the same extent must the horn be removed; not, however, taking the whole away the first day, but completing the removal the second; ever keeping in mind, that, as the fleshy sole will never form over the dead or bare sole, so, to gain a new horny secretion, every portion of the denuded horn must be removed. No greasy matter should be applied over the fleshy sole exposed; but a pledget of tow or lint moistened with tincture of myrrh may be laid on. If the case has been a neglected one, and there has been extensive separation of horn, with a very considerable suppurative process, it will require much vigilance to prevent it running into canker. There must here be an immediate exposure of the whole surface, and a complete excision of every portion of separated underrun sole, and a mild stimulant application made to the sensible sole, to change the purulent into a horny secretion: for which purpose nothing is better than the butyr (chloride) of antimony, or a moderately strong solution of sulphate of zinc (white vitriol), either of which should be applied over the bare surface; the former, as more escharotic, should be very lightly applied only. If on the next day the secretion of new horn, though very thin, is yet moderately complete, dress it dry; but if fungus appears to be forming, touch such part again with the butyr or zinc: proceed in this way every day to combat the luxurious sprouting, and so encouraging the formation of new horn. Dress the surface dry, and apply such cover as will defend the part as well from moisture as unequal pressure; but general and healthy pressure, in a moderate degree, will be salutary: tack on a shoe lightly over all. When matter has proceeded to evacuate itself by the coronet, exactly a similar plan must be pursued with that mild one which preceded this; unless this latter should proceed to a similar state of intensity, when the same plan must be adopted for that also: the original wound below should be traced and opened, so as to give a free exit to the pus. And in all these cases, when the symptomatic fever rages high, bleed, give physic, and treat in every respect as under inflammation. Perfect quiet is absolutely necessary in every instance of puncture; the slightest exercise irritates, and should be avoided. A shoe should be made so as to '*lie off*' the injured parts, and should only be very lightly tacked on with three or four nails unclenched, which will allow of a ready removal and re-application.

TREAD, OR OVERREACH.

A WOUND about the coronet is a very common accident to horses, from one foot being set on the other, when the outer margin, or heel of the shoe, will wound the integuments, together with the vascular coronary rim. Or it may occur from a blow inflicted on the heel of the fore foot by the hinder one overreaching it. In the first instance, all these cases are to be considered as simple wounds, or rather as lacerated bruises, which, if extensive, have produced death in the surface and adjacent parts of the tread; in which some inflammation must occur to remove the edges thus injured. In no instance, therefore, should an early application of irritating or caustic matters in use by the farriers be made, by which more extensive inflammation and an increase of sloughing are produced. On the contrary, wash with water to remove dirt, &c., apply a pledget of tincture of myrrh, or tincture of aloes, or compound tincture of benjamin (*friars' balsam*), &c.; and, if the wound be considerable, wrap up the whole in a poultice; if not, apply over it a simply defensive dressing, and bandage lightly up. Should the injury be slight, it may be healed at once by the adhesive inflammation; but if not, a moderate suppuration only will occur. Under some circumstances, however, more extensive mischief will follow, when the case comes to be considered under the subject of *quittor*.

QUITTOR.

THE various accidental lesions just described sometimes take on a state which, instead of following the usual course of phlegmonous inflammation by proceeding outwards, directs its morbid action inwards, attacking all the internal parts of the foot in its progress: this state is called quittor, which, by this shewing, is a diseased state supplementary to some other lesions of the foot, be it of prick, tread, overreach, bruises, blows, grease, or thrush. Now, when it is considered of what different materials this wonderful organ is composed, some vascular and sensitive in the highest degree; some in which the powers of life are very feeble, and their organization simple; while other parts exist which are varied in their shades between the two; when this is considered, we need not wonder that any morbid attack on the foot, having a predisposition to extend inwards instead of outwards, should in its course present different pathognomonic symptoms, dependent on the differences of its origin, progress, and principal seat of evil; whether it be in the vascular cellular tissues, component of or connected with the skin; the tendinous, aponeurotic, or ligamentous expansions; the cartilages and cartilago-fibrous masses, and the bones themselves. It is from a consideration of these structural differences that the French divide quittor into several kinds, principally formed on the seat of the disease. In Hurtrel d'Arboval's *Dict. Vet.*, will be found an elaborate account of them, with the French method of treatment common to each variety; and although it is the peculiar faculty of this ingenious nation to spin very fine, it will be found that these distinctions lead to a just consideration of the disease, to the forming a more correct prognosis, and to the adoption of a more decisive and appropriate line of practice than could be gained without them. They are, 1st, *javart simple*—that which attacks the skin and its cellular connexions; 2d, *javart tendineux*, when it forms itself within and around the sheaths of the tendons; 3d, *javart encorné*, is intended to designate that which originates in the lateral portion of the coronet; and, 4th, *javart cartilagineux*, which is the state of quittor usually derived from the former, but having now proceeded to ulceration of the lateral cartilage. These several varieties are occasionally blended by circumstances*; but the veterinarian who is familiar with this disease will recognize them, and acknowledge that, if not applicable to the majority of cases, they are, nevertheless, descriptive of very many of them. Mr. Percivall, however, will not allow these quadruple states, as described by the French veterinarians, to be genuine; yet he does allow, that it often happens that two of these forms or states are present at one and the same time, to which every observant practitioner we believe will agree. 'The simple form of the quittor of the French school,' says Mr. P., 'is, in truth, but a spurious one. Some portion of the skin of the coronet receives a bruise from the opposite foot; the cellular tissue underneath it becomes clogged with extravasated blood, and loses its vitality; and the consequence is, that both it and the injured portion of skin slough away, leaving a deep circular chasm to be filled up by granulation. Although, however, this does not of itself constitute what veterinarians in this country are in the habit of regarding as quittor, it may, for want of cleanliness and medical attention (the matter being allowed to be in it and burrow), degenerate into one, and no doubt often does.'—*Hippopathology*, vol. i, p. 246. *Genuine quittor*, this acute veterinarian considers as simply consisting in sinuses or fistula running into the foot; but we see by his subsequent remarks, that he, too, considers its progress will be very likely to be attended with many varied symptoms and characters. Quittor has also by other acute writers been considered as having a Protean character, and as appearing under many guises: some compare it to the human whitlow, and there are unquestionably traits of similitude between the seats, pathognomonic symptoms, and progress of the disease†; but its description would best unite with the *car-*

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* 'Indépendamment des symptômes particuliers à chacune d'elles, tous ces javarts en ont de généraux qui leur sont communs. Dans tous, l'irritation phlegmoneuse commence par la peau ou le tissu lamineux sous-cutané et s'annonce par le prurit qui la précède. Bientôt la partie s'enflamme, se tuméfie, devient tendue, fait éprouver au malade de très vives douleurs, et l'oblige de boiter. Souvent l'inflammation se propage aux parties environnantes à une certaine étendue du membre: elle est quelquefois assez forte pour réagir sympathiquement sur l'economie générale, et déterminer de l'agitation et de la fièvre. Ces phénomènes ne cessent que lorsque le *bourbillon (the core)* est formé et près de se détacher.'—*Hurtrel d'Arboval, Dict. Vet.*

† '*Furoncle:* inflammation compliquée d'étranglement de l'un des flocons de tissu cellulaire qui remplissent les aréoles du tissu fibreux de la peau, qui détermine la gangrène *par compression* du paquet de tissu cellulaire enflammé, et la gangrene *par distension* des parois de l'aréole fibreuse, d'ou résulte leur chute, sous forme d'une escarre blanche et cylindrique, qu'on nomme le *bourbillon.*'—*Dict. des Termes de Med. Chir. Anat. et Art. Vet.*——'*Bourbillon:* corps blanchâtre, grumeleux et élastique, formé par le tissu cellulaire étranglé et gangrené au centre du *furoncle.*'—*Idem.*

tilaginous quittor. *Simple* quittor might be made to signify that vacillating state, when any one of the usual causes of canker, as punctures, treads, blows, &c. &c., appeared to refuse to yield to the ordinary treatment, but, on the contrary, assumed some one or other, or of one or more of these confirmed states of quittor.

In the *tendinous* quittor we recognize that state of the complaint which originates in wounds from nails, flints, or other matters penetrating the sole; and in those also which follow pricks in shoeing. In these cases, when either from original neglect or intensity in the injury received, the tendinous or ligamentous connexions of the flexor tendon are invaded, perhaps the tendon is itself wounded, or the coffin-bone is entered, or the joint is penetrated, we may expect much derangement to follow, marked by the extreme lameness, and the excessive pain which is present, compared with the tumefaction. The opening may not of itself be large, but the discharge is considerable, and a probe passed in will with ease traverse a vast extent of surface, upwards towards the heels, and centrally also, where it probably may be made to strike against the carious coffin-bone. The *encorned* and *cartilaginous* quittors may be considered together; the latter being usually one of the proceeds of the former. Many accidents are liable to separate the vascular coronary ring: treads from the calkins are a fruitful source; and therefore it is more usual to see it on the inner than the outer side, and on the quarter in preference to the front or to the heels; although it does happen here also by overreaching, &c.* In this case, the vascular cutis or *quick* of the hoof is separated by the violence, the early stage being accompanied by adhesive inflammation, in which state a little judicious treatment, as a poultice, &c., will often prevent further evil: but if suppuration follows, and if it extends to the laminæ, the horn becomes disengaged and the evil finally may communicate itself to the lateral cartilage; in which, according as the anterior edge and base is the affected part, or as the posterior portions, which are less hard, more organized, and semifibrous, become the objects of caries, or of ulceration, in that degree the disease usually proceeds more tardily or more rapidly.

Treatment of Quittor.—This, like most matters of opinion, has varied with the theories and the customs of the day. Formerly all quittors were attempted to be cured either by caustics or by the actual cautery, or by both together. La Fosse the elder, who was rather fond of novelty, in some measure overturned this practice in France, and introduced a new method, founded on an idea that the obstinacy and derangement that accompanied the complaint originated in the lateral *cartilages* becoming carious, which he affirmed were capable of being thus affected, but incapable either of exfoliating like bone, or sloughing like ligament; and therefore, to promote a cure, the whole cartilage must be removed†. This practice became universal in France, and extended itself here also, particularly after M. St. Bel assumed the professorship of our Veterinary College. Here it reigned a little time only; but in France it continued until the writings of M. Girard on the subject checked its career, and brought its practice into some disrepute. This celebrated professor shewed the superiority of the old method of employing corrosives; and the success of the practice at the Alfort school, over which he presided, tended further to bring it again into use. Perhaps also our own success with it might have hastened the re-adoption‡.

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* 'Une *atteinte* (overreach) qui entame la partie postérieure du talon, determine une plaie suppurante et découvre le cartilage dont il s'agit, devient une cause de ce javart.'—*Hurt. d'Arboval.*

† Cartilages are not, however, wholly incapable of exfoliation; they are vascular, as our anatomy will shew; and as such, although their powers of life are small, yet, by active and judicious measures, they may be stimulated to throw off the dead and reproduce living portions: the process, however, it must be allowed, is always slow and not always certain.

‡ The extirpation of the cartilages is not yet altogether abandoned in France, and in the reaction of opinions may yet be further advocated; although we augur that it can never again wholly supersede the milder methods. The *Jour. de Méd. Vétér. et Comp.* contains an ingenious article on this subject from M. Renault, V.S., who attempts to prove 'that the espousers of either practice (caustic or extirpation), if they had marked the particular spot where the cartilage proved carious, if they had also remarked the depth and direction of the sinus, and then had connected these observations with the structure of the diseased tissue, they would have agreed that each of these modes of treatment was judicious, depending on the inroad made by the disease, and also on the situation of the caries. M. Renault is led to this reasoning on a structural examination of the lateral cartilages; and as his view is physiologically, pathologically, and practically important, I shall quote it. 'Repeated

The *practical part of the treatment of quittor* should be commenced by acquainting ourselves with the actual state of the parts; and this is the more necessary, as it will often prevent us from being involved in a fruitless attempt, which will probably bring disgrace on our practice, torture on an innocent beast, and ensure trouble and useless expense on our employer. When, by the use of a blunt leaden probe, we meet with a firm hard body within a quittored wound, we then detect a bone, which, if extensive, the case cannot be said to be a favourable one; but unless the cartilages be also carious, such horses frequently become sound, therefore our prognosis should be to that effect. If, in addition to caries of the bone and cartilages, we observe a flow of synovia also, a perfect cure is hardly to be expected, although even here active treatment and the powers of the constitution have occasionally restored the foot to a very considerable degree of utility; and as these cases happen principally to the hind feet, and very frequently to those of our large and valuable draught horses, the attempt might be worth the trial. Caries of the lateral cartilages always bespeaks a lengthened treatment, and, if accompanied with denuded bone, it is more so: should the joint be also exposed, the case is nearly a hopeless one. It has been before observed, that the anterior portion and the base of the lateral

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examination of it (the lateral cartilage) anteriorly and towards its base only goes to confirm its similarity to other cartilages, properly so called: it is white, flexible, frangible, and homogeneous. As we approach the borders and the posterior part, it loses its homogeneous characters; it is no longer frangible; and, in being rent, discovers a fibro-filamentous texture. Still more posteriorly, the fibro-cartilaginous organization is more manifest, and here, on an attentive view, seem to exist *isolated cartilaginous knobs*, surrounded by substance entirely fibrous. Lastly, the extreme posterior end is fibro-adipose, and is confounded with the fatty frog Now, if we recal to mind, 1st, that the cartilaginous tissue possesses but in a very low degree the vital properties (contractility, sensibility); 2dly, that inflammation excited within it by external irritation proceeds very tardily, and commonly ends in caries; 3dly, that caries spreads so long as any continuous cartilage is left, it will not be difficult to explain the first part of the problem. For instance, admit that caries is already established within the interior part, or in the base of one of the lateral cartilages, the mortified spot in such tissue will communicate irritation and consequent caries to all around it. If, with a view to cut off this contamination, we destroy the carious spot with the iron or some caustic, we produce another kind of irritation, which, *in the majority of cases*, also ends in caries, even prior to the separation of the slough; or else, should the slough first be detached, the cartilage not being from its nature capable of granulation, and in consequence exposed to the air, speedily takes on inflammation and caries, and we have all our work to do over again. And there will arrive a time even when one cannot employ cauterization without danger; when the caries has destroyed the cartilage down to the capsular ligament which it covers, or when the cartilage has become so attenuated, that the caustic can no longer separate but a thin pellicle from it. What is to be done under such circumstances? It seems to me not to admit of hesitation: the cartilage is the carious part; it must be removed; and especially may be, since the operation does not render the horse so useless as has been represented. If, on the other hand, the sinus is situated in the heel, although the fibro-cartilaginous tissue is carious, yet, there being here demonstrable cellular tissue, we can conceive the part capable of an eliminatory inflammation; and we shall with more reason look for this, should one of those cartilaginous knobs, surrounded by fibro-cellular tissue, happen to be the seat of the caries. According to this, the solution of the second part of the problem becomes equally obvious, the salutary effects of the caustic and iron being explicable as follows:—In destroying parts contiguous to the caries, a slough is produced, the same as in cauterization of caries in the anterior portion of the cartilage; but an effect that cannot follow there is produced here, in this more vascular tissue: the character of the inflammation becomes changed; it assumes the suppurative form; granulations arise (though tardily) underneath the slough, which is elevated and detached by the pus; and the wound, now a simple one, speedily cicatrizes.'

Another writer (C. Prevost) on the same subject, in the *Journ. Pratique de Méd. Vétér.*, informs us that he has met with ten cases in his practice, wherein five were cured by extirpation, three by caustics, one by cauterization alone: the tenth resisted both caustics and cauterization, and was not further treated. M. Prevost is led, by his observations on these cases, to conclude 'that Girard's method (i. e. corrosives) is the least painful and the most expeditious, and that which leaves behind the least consequent disorganization. At the same time, he agrees with Girard in considering the practice inapplicable in those cases in which the quarters or heels are in a state of suppuration, the sole under-run, *the base of the cartilage and the coffin-bone carious*.' He continues: 'That the removal of the quarter and entire extirpation of the lateral cartilage, though a nice and difficult operation, is not to intimidate us.' The extirpation of the cartilage is, indeed, a nice and difficult operation. The hæmorrhage is great, the danger of penetrating the articular cavity is so likewise; and the removal of so large a portion of hoof as is necessary, and the almost inevitable destruction of the coronary secreting ring, from whence alone a healthy continuation and connexion of horn can be expected, and the certainty otherwise of a false quarter, are very great objections to the excision of the cartilage; add to which, that in almost every instance some lameness is the consequence. There is, however, with some veterinarians, a mediate practice pursued, which is that of cutting away such portions only of the cartilage as are affected, and treating the *remainder* of it, together with the sinuses, by escharotics. On the subject of attacking the cartilaginous caries by the actual cautery, Hurtrel d'Arboval observes, with great truth, that it ought never to be attempted when it exists near the articulation; and as it is his opinion, that to cauterize effectually we must destroy the whole of the cartilage, it is altogether better to excise; into which operation he enters minutely, and to which I would refer the student.

cartilages are compact, solid, and strictly cartilaginous; when, therefore, we detect a caries of these parts by a view through the lateral opening, or by examination by the finger, which is best able to discover its denudation and carious state, we must then be aware that the process of exfoliation is a very difficult one to promote, in consequence of the small powers of life in the part: if our efforts succeed, the process will probably be a lengthened one; but, as these cartilages extend themselves posteriorly, they become more and more of a cartilago-fibrous texture, and thus, as being more highly organized, are more capable of a sloughing and reproductive process; so, when a caries of the cartilage is detected, if it have a backward direction towards the heels, and not burrowing deep inwards towards the articulation, we are warranted in expecting to succeed by judicious treatment. In all extensive quittors with much disorganization of parts, particularly of the cartilaginous and ligamentous, we are imperatively called on to remove not only the separated and dead horn, but also to intrude on the living, if it obstructs the operations in our strict examinations and our surgical treatment, either with the knife, the cautery point, or the filling up each sinus with an escharotic. In no part of the treatment is judgment more displayed than this: we must spare, and yet spare not; we must expose every particle of the internal part of the foot, be it walls, heels, or sole, that obstructs our processes; but we must most carefully avoid removing one particle unnecessarily: and it must be kept in mind, that, unless dictated by the circumstances we have pointed out, all cutting away of horn is to be avoided as delaying the cure, contenting ourselves with keeping the hoof well thinned, and pliant by moisture, &c. And, notwithstanding the prejudices against firing in quittor, I would, whenever a circumscribed spot of carious bone could be got at, without endangering articular or bursal cavities, apply a pointed cautery; neither should I be deterred from touching such a spot in the centre of the lateral cartilage; but I would lightly apply it only, and not at all when it was carious towards the base of the cartilage. This will often save much time, even in the worst cases, and equally in those which are destined to an after escharotic treatment: occasionally it will do more; for it sometimes happens that this alone will bring about a new action, when the cartilages and ligaments do not very extensively participate, as occasionally happens when a nail has penetrated the anterior part of the sole, and wounded the bone. In all other cases, it will be prudent to avoid any extensive removal of horn; but it should in every case be thinned as much as possible, to lessen the resistance. The general end we have in view is to promote a removal of the dead parts, if there be any; if not, our attempts must be principally directed to alter the diseased action going on, and by so doing to promote a new one. As the cartilages are in these cases often affected, and as when separated they are found hard, often ossified also, it has given rise to an opinion among farriers that it was absolutely necessary to the cure to get rid of a '*quittor bone;*' and likewise as the soft parts are also often destroyed by the disease and slough away, so they have been, in the simplest cases, not content until such an effect did follow; if not from the disease, yet, as a *core* they think must come out, they set to work to make one. But our surgical principles now are, that we make use of so much stimulus, and only so much, as shall destroy the diseased surfaces and the action which produced them. If it can be done by mild means, as have been lately advocated by Mr. Newport*, it is by far the most humane and eligible method. But if the sinuses are extensive, and the disorganization has extended to the cartilages and ligaments, we must proceed further: indeed, it is seldom that we can stop short of the extent of the farriers' system, and that practised by the Professors of Alfort (perhaps almost the only instance in which their practice does agree), to '*core out the quittor*' by a forcible sloughing, brought about by the introduction of some caustic substance, after this fashion:—When the opening is very small, and the sinuses deep, but contracted, make a paste with equal parts of resin and corrosive sublimate, softened with tar. Impregnate small pieces of wool or tow fully with this paste, which place around the end of a probe, and introduce one by one, to the bottom of each sinus, filling also each up to the orifice with the same, but not jamming them in with force. When, on the contrary, the orifice of the wound is sufficiently large, and one or two straight sinuses only exist, a bougie may be made with paper, dipped in the paste, and introduced; or in case the diseased action be extreme, and, as a farrier would express it, the quittor is very *foul*, a powder composed of equal parts of resin, sublimate, and verdigris, may be rolled within thin paper, so as to make also a bougie, which being greased or rubbed with tar to render it slippery, should be introduced to the bottom of the sinuses; but it must be remembered, that when these are numerous and irregular in their direction, the first is by far the best mode. The hoof should, as soon as the caustic is introduced, be put into a poultice; but under no other circumstance is an extensive removal of horn prudent. In two or three days after the introduction of the caustic, there will follow great heat and tumefaction of the foot; and, at last, the orifice will burst out, expelling the slough, together with the application that occasioned it; after which it may be expected that the wound will go on healthily to heal. If, however, unfortunately, this should not be the case, recourse must be again had to another introduction of escharotics, and which plan must be persisted in until the amendment be apparent.

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* As milder methods, a weak solution of lunar caustic, or of caustic alkali, may be injected with a syringe, and may also have pledgets dipped in the same introduced: but the plan of Mr. Newport, which has been adopted at the Veterinary College, is 'to thin the sole until it will yield to the pressure of the thumb: then cut the under part of the wall in an oblique direction from the heel to the anterior part immediately under the seat of the complaint, and only so far as it extends, and rasp the side of the wall thin enough to give way to the pressure of the over-distended parts; and put on a bar shoe, rather elevated from the frog. Ascertain with a probe the direction of sinus or sinuses, and introduce into them a saturated solution of sulphate of zinc *(white vitriol)*, with a common syringe that will hold from a drachm and a half to two drachms of the liquid: place over this a dressing of the common cataplasm, or ung. terebinth., and renew the application every twenty-four hours.

CANKER.

THIS affection, like that of quittor, has some peculiarities of character; for while quittor appears principally to attack the cartilaginous, tendinous, and ligamentous parts by a decomposing process, canker spreads over the surface of the soft parts, particularly of the sensible frog and sole, a fungous excrescence, having somewhat of a fibrous texture, and exuding a sero-purulent offensive discharge: continuing to sprout with a morbid luxuriance, it inoculates the soft parts within its reach, particularly of the sensible frog and sole, and destroys their connexions with their horny covering, so that the latter may be totally separated in the advanced stages. Canker has been likened to scirrhus and to cancer, and, in some of its external characters, it somewhat resembles fungus hæmatodes: but a true parity cannot be maintained with any of these. It can hardly be said to have any constitutional origin*; it is essentially local, seldom if ever spontaneous, but either accidental or secondary to some other affection, as grease, thrush, &c. It appears oftener in hot weather than cold, and is more frequently seen in crowded and filthy stables than in well-regulated ones. It is now unknown in the army, and, as we may suppose, were the same preventive causes applied, would be almost equally unknown elsewhere. The disease originates in various ways: one source, as supposed but supposed only, is the high heels or calkins of the heavy draught-horse, which remove the frog from that pressure which seems so necessary to its healthy state. The state of wet filth these horses stand in in some stables is a more likely source: moisture plied to the frogs is a most active agent: it disorganizes the frog itself, increases the growth of the horn of the heels, which aggravates the evil, as heels and a full healthy frog are seldom seen together. Another common o is neglected thrush, in which the suppuration, extending beyond the sensi frog, inflames the vascular sole, and extensive ulceration succeeds. Viru and neglected grease will often occasion it, and it is no uncommon circumsta for quittor to degenerate into canker: less frequently will the latter take on state of the former: but I have known canker disease the ligaments and b of the feet. When a canker is the consequence of a wound of the sole, and tends to the flexor tendon, it is commonly of the worst kind. Treads, brui suppurating corns, or whatever produces inflammation and an ulcerating proc may occasion quittor.

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* I would not write too affirmatively, from the difficulty of exactly fixing our notions of the true characters of constitutional affections. Canker has been said to alternate with grease; and that, when one foot has been affected and has suddenly amended, the other has been found to have become cankered; indeed, it is said to have gone all round in this way: these, however, are rare cases, and do not destroy its general local character, nor give it much claim to a constitutional affection. White legs may occasion a predisposition to it, because white feet are less strong; but though white feet may be hereditary, we cannot say that canker is hereditary. It may be added, that constitutional remedies have never done good; and I am disposed to think it is much more easy to establish its character as essentially local, than any constitutional connexion. Mr. Youatt, on the contrary, considers it constitutional; and Mr. Goodwin, according to a report in *The Veterinarian*, does the same: it is the opinion of the former gentleman that it is hereditary; and yet his excellent hints with regard to the prevention, which so pointedly state that, though difficult to cure, 'it is easily prevented,' would seem to assure us he has little faith either in its idiopathic or hereditary tendencies.

Treatment of Canker.— The principal indications appear to be, first, to red the inordinate increase of parts to a level with the surrounding surface; next, to restore the healthy secretions. To lessen the disposition to secrete inordinate quantity of crust of the walls at the expense of a sufficient secre of sole, the plantar arteries were taken up by Mr. Coleman, but without ben When, however, he divided the immediate branches furnishing the coro ring which cut off the secreting supplies from the horn of the walls, the hor the sole began to form in larger quantities; and the experiment has been peated by others with the same result. The division of the plantar nerves been employed for the purpose also, but with equivocal benefit: but it acted beneficially in another way, by removing much pain, and enabling animal to bear on the foot, which, by the pressure thus obtained, is import When neurotomy is performed in canker, Mr. Coleman would seem to con it to those cases where the disease had its seat principally in the sole, bar, frog: neither would he, in using it, do more than simply divide the ne because the object here is to destroy sensation temporarily only. When fungus extends itself considerably beyond the edges of the horn, it is prud at once to remove it to a level with that by the knife. This will occasio considerable hæmorrhage, which may be checked by touching it lightly w muriate of antimony, or other escharotic: after which, the edges of the ho sole that surround the opening from whence the fungus arises may be got Proceed carefully and accurately to examine what extent of sensible sole separated from the horny; or, as a farrier would say, how much is '*underr* Exactly to this extent must the sole of the hoof be removed with a draw knife; for it must never be lost sight of, that the horny sole once separa never reunites, but becomes a foreign body, and, as such, occasions the sa effects that occur from the presence of foreign bodies in all other parts, nam irritation and an inflammatory process to attempt the removal of the offend substance. Not only must this be done in the first instance, but at every fut dressing the same attention should be paid to examine if any further separat has occurred, that it may be removed also*.

Having thus fulfilled the first indication, by reducing the diseased fung and having lessened the irritation that occasioned it, by removing the detac horn, the next process is to promote a more healthy action in the diseased s face: two plans tend to this end – the first by *stimulants* applied to the surf of the vessels particularly; the second, by *pressure*, which strengthens th generally. As long as there is a profuse secretion of a curd-like matter; a as long as the fungus sprouts greatly beyond the surrounding parts, so long the *cankered* action is going on, and, during this time, no secretion of firm horn will take place. An unhealthy formation of thin half-formed horn may be observed over many portions of the surface; but this will prove an imperfect secretion, and must not be allowed to remain; on the contrary, it must be continued to be carefully removed at each dressing, until, by the application of escharotic stimulants, and the benefit of pressure, a healthy granulating surface appears, that will produce only an ordinate and proper quantity of good pus or matter, and finally end in the formation of sound horn. After the exposure of the whole cankered surface therefore, and of its treatment as before directed, let it be sprinkled with either of the following powders:—

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* It is the French practice to remove the whole horny sole at once; under a presumption tha will be totally removed in the end, and that, by desoling, the way for future treatment will be m clear: this plan, however, savours too much of barbarity, and should only be resorted to in v desperate cases. The knife can be employed at each dressing to remove the dead horny portion, to thin the living part, so as to prevent its edges bearing unequally on the fungous protrusion: wh thinned, it may even be made a medium of pressure. We must, on the other hand, never be afrai removing sufficient of the sole, for were it even all removed, the laminæ would support the f perfectly; and, by a fair open surface exposed, we can apply uniform pressure: expose the surfa therefore, sufficiently, but not by at once desoling, except imperatively called to it.

No. 1.—Red oxyde of mercury (*red precipitate*)...	half an ounce
Acetate of copper (*verdigris*)...............	ditto
Calamine...	ditto.

Mix.

No. 2.—Sulphate of copper (*blue vitriol*)............	one ounce
Alum	ditto
Carbonate of lead (*white lead*)..............	ditto.

Mix.

The cankered surface being lightly covered with either of these, or any other escharotic stimulant judged proper, let it be dressed as dry as possible, first by a layer of lint, over which place pledgets of tow thickly over the bottom of the foot, which should be done very judiciously, so as to fulfil the remainder of the indication, that is, to keep up a firm and equal pressure; and to insure a uniform continuance of it, place over the tow a piece of canvass to keep all smooth, and then introduce over the whole thin strips of iron or steel, slid under the shoe and crossing each other, which will retain the dressing and keep up a continual pressure, on which so much depends. This being done, wrap up the whole in thick sacking or hose, so as to keep the foot perfectly dry, which is of the utmost importance, as nothing so tends to the increase of the fungus and the exclusion of the suppurative process as moisture: nor does any thing so strongly prevent its future increase, and restore the healthy action as dry applications, united with firm and regular pressure over the sprouting surface. A very great fault is often committed by dressing cankered feet too seldom. I would, however, except the first dressing, where it has been severe: here it is usual to let it remain two or three days, until sloughing may be supposed to have commenced and matter to be formed; but afterwards, no bad case ought to be dressed less frequently than every day. From a wish to avoid trouble, this is often neglected, and a cure that might be quickly performed is needlessly protracted; and, in the end, proves less complete than it might otherwise have been: for when the dressing is delayed, every thing that has been done is rendered nearly useless by the pent-up matter extending itself under other portions of the sole, and by the increase of the fungus. Nor must it be lost sight of, that it is imperative at each dressing that the luxuriant and diseased slough or fungus must be first removed, not only to produce a level surface, but also to procure a complete view of the parts underneath: for it proves often a most insidious disease, and misleads unless carefully watched: sometimes, while one part heals rapidly, another is extending as fast, and a third perhaps remains stationary. The destruction of the fungus, when very high and luxuriant, may be effected, as before-mentioned, most conveniently by the knife; but, when not so prominent, it may be done by the application of any of the caustic and escharotic matters generally used*. Muriate of antimony is very commonly applied for this purpose; and as it can be laid on every part, and between interstices, by means of a small brush, where a dry substance might not reach, so, in this respect, it is preferable. It has also another advantage, which is, that, by turning the surface immediately white, it shews what parts it has been applied to, and what are left undone. The lapis infernalis, or caustic potash, from its quick action, is also a convenient application. I have likewise used a solution of lunar caustic, but the application of the same in substance is not sufficiently quick to be useful. The caustic dressing, be it what it may, should be continued no longer than there is any diseased surface remaining; nor should the escharotic process ever be pushed to the extent of corroding deeply into the substance of the vascular parts. Such conduct betrays the grossest ignorance, and therefore can hardly be expected in the veterinarian; but it has happened, in the practice of smiths and farriers, to the utter destruction of the foot. Yet, on the other hand, until the cankered matter, from being profuse, thin, and clotted with white masses, change to a thicker, less fetid, and more healthy discharge, as well as lessened in quantity, the sore is still a *cankered* one; and until the cauliflowered white fungus change to a healthy red granulated appearance, the unhealthy discharge must continue: and, in all such cases, a due degree of pressure, united with the application of some escharotic, milder or stronger, according to circumstances, may be considered as requisite[*]. But as soon as the fungus is completely reduced, the discharge is lessened in quantity, and improved in quality, accompanied with a sprouting of healthy horn; then nothing more is necessary than to watch the parts, to dress dry, and sufficiently often; still keeping up a moderate degree of pressure till the sore be completely hoofed over. Horses are often turned out during the process of cure of canker; but as the foot becomes unavoidably exposed to moisture, it is hardly ever admissible, unless under circumstances of a very dry season and situation; and even then, particular care is necessary to guard against occasional moisture, by a more extensive application of defensive dry dressing: but mill-work under cover offers an excellent method of combining pressure with benefit to the general health; observing, if the horse has been subjected to neurotomy, that his insensibility does not make him injure his foot.

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* The veterinarian should bear in mind that he will often derive great benefit from varying the escharotic used. The parts get habituated to the use of any one frequently, and then resist its action, but again submit to a new one. This is so common a case, that it will be prudent to change the caustic at every third or fourth dressing, and, whenever the effect slackens, it is imperative to apply a new one.

FALSE QUARTER.

THIS can hardly be considered as a distinct complaint, but, more properly, as a consequence resulting from some one of the former diseases; in which, from the injury done to the coronary vascular ligament at one immediate part, it can never afterwards secrete horn in a perfect line of continuity; but the break or interruption which first originated between the old and new horn continues to be propagated. Such a blemish is called a *false quarter;* and it is evident that it must greatly tend to weaken the hoof. It likewise sometimes produces the same unpleasant effects as a sandcrack, by admitting the vascular laminæ between the opening, and, by a sudden approximation of its sides, squeezing them, to the extreme pain of the animal. The *treatment* can be only palliative. In cases where it is *likely to happen*, thin the horn thoroughly, and apply a blister: but when already formed, keep the horn of the part always thin: use a bar shoe, and '*lay off*' (as a smith calls it) that quarter; that is, the portion of crust immediately under the blemish must not rest on the shoe. This may be done either by paring the foot, or by an indentation in the shoe; the choice of which is left to the prudence of the operator, with this exception, that, in a weak thin foot, the alteration should always be made in the shoe.

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[*] Hurtrel d'Arboval observes, that, when he has been foiled by the usual caustics, which he has found have sometimes had the effect of encouraging a new and unhealthy suppuration under the eschar, that has evinced a gangrenous tendency, or when the caustic applications, from a peculiar irritability probably, have exhibited an intensity of operation injurious to the parts underneath, he has had recourse to a method whereby the degree of cauterization can be limited to the wishes of the employer. This is effected, according to his account, by dusting over the surfaces with a mixture of sulphur and gunpowder, which, being touched with a heated iron, explodes, leaving the sulphur in a state of slow combustion, the termination of which causes a black eschar, which is to be raised by very careful scraping as much as possible, without exciting hæmorrhage. The same process is then to be repeated over and over, until there is reason to judge that the cauterization has been sufficient to destroy all the unhealthy surfaces, so as to render them incapable of renewing the morbid action. This method, our author assures us, has proved very successful with him.

OF SURGICAL OPERATIONS,

AND THE VARIOUS RESTRAINTS IT IS SOMETIMES NECESSARY TO PLACE THE HORSE UNDER FOR THEIR DUE PERFORMANCE.

When it is necessary to perform any painful or unpleasant operation on so powerful an animal as the horse, it is of consequence to secure both him and ourselves from the effects of his resistance, by subjecting him to a *restraint* equal to the occasion. Horses are very unequal in their temper, and bear pain very differently; but it is always prudent to prepare for the worst, and few very important operations should be attempted without casting. To give directions on such minute points to the experienced veterinarian, might perhaps seem unnecessary; but as this work is intended as a guide to the inexperienced and junior practitioner also, so I shall not *always* prove uninteresting or uninstructive when I descend to these minor matters. Humanity should be the fundamental principle of every operation, and we ought always to subject this noble animal to pain with reluctance; but when circumstances absolutely call for it, we should carefully avoid an unnecessary infliction of suffering. The resistance of the horse is terrible, and it is but common prudence in the veterinarian to guard himself against the effects of it. The *lesser restraints* are various: among them may be first noticed the *twitch* and *barnacles*. The *twitch* is a very necessary instrument in a stable, though, when frequently and unnecessarily used, it may have the ill effect of rendering some horses violent and vicious to resist its future application. In many instances blind-folding will do more than the twitch; and some horses may be quieted, when the pain is not excessive, by holding the ear in one hand, and rubbing the point of it with the other. A firm but soothing manner will often engage the attention and prevent violence; but it is seldom that either threats or punishment render an unruly horse better. Inexperienced persons guard themselves against the hind feet only, but they should be aware that some horses strike as truly and as terribly with their fore feet: it is prudent, therefore, in all operations, to blindfold the animal, and the more so, as by this he becomes particularly intimidated, nor will he often strike without an aim. *Barnacles* are a sort of clams used by smiths, into which they introduce the nose in the manner of a twitch. They are only admissible, when a person is so situated as to be wholly without assistance. When one of the fore extremities requires a minute examination, it is prudent to have the opposite one held up; it may, in some cases, be tied up by a noose: and when one of the hinder legs is the object of attention, the fore foot of the same side should be held up, as by this means the animal is commonly prevented from striking, by the failure of his lateral support. If this precaution be not taken, still observe to keep one hand on the hock, while the other is employed in what is necessary, by which means, if the foot become elevated to kick, sufficient warning is given, and the very action of the horse throws the operator away from the stroke. Without the use of these precautions the practitioner will not only expose himself to much risk, but a neglect of them is sure to subject him to a suspicion from those around that he does not know his business. The *trevis* is the very utmost limit of restraint, and is seldom used but by smiths, to shoe very violent and powerful horses: whenever recourse is had to it, the greatest caution is necessary to bed and bolster all the parts that are likely to come in contact with the body. On the continent I have seen horses very dexterously shod in this machine, and apparently put in under no other necessity than either to avoid labour, or, ridiculous as it may seem, to prevent the clothes of the smith from being injured or dirtied by the common method. Horses have been destroyed by the trevis, as well as by casting, or, at least, their aversion to the restraint has been such, that they have died under their own resistance; it, however, has a very decided advantage over casting, as it is seldom the vertebræ are fractured by it; and it might be so framed, I am convinced, as to render it a most efficient restraint for the performance of many operations, and might be further used as a slinging machine in many cases requiring suspension, which might here by the adjustment of machinery, be made to act in many ways favourable to the horse[*] and the practitioner. The *side-line* is now very generally used, not only in minor operations, but also in those more important. Many veterinarians seldom use any other restraint than this, in which they consider there is safety both to the horse and to the operators. It is particularly applicable to such horses as are disposed to strike behind; and consists in placing a hobble strap around the pastern of one hind leg, and then carrying the end of the rope attached to it over the withers, bringing it back again under the neck, and over the other portion, so as to leave a slipping collar, as it were, round the neck, by which the hinder leg should be drawn forward as far as it can without elevating it from the ground. By this displacement of one leg the horse is effectually secured from kicking with either. Occasionally it is thus applied:—hobbles are put on each hind leg, and the rope is passed through each of their rings or D's. Carry this rope, as in the former instance, over one of the shoulders and around the breast, along the body, and having again carried it through the hobble rings, pass it once more around the breast. Now draw both hind legs rather forward, and the horse will be secure.

Casting.—It is the practice with many veterinarians to perform almost every surgical operation by means of the restraints of the twitch and of the side-line, abandoning the operation of casting almost wholly: the objections to it arise from the dangers incurred while forcing the horse to the ground[†]. Mr. Bracy Clark simplified casting, by inventing some patent hobbles, having running chains instead of ropes, and which, by a shifting D, made the loosening of any one hobble, for the purpose of getting at a particular leg, unnecessary. These were still further improved by Mr. Budd, so as to render a release from all the hobbles at once practicable. Hobble leathers and ropes should be kept supple and pliant with oil, and ought to be always examined previous to using: nor should the D or ring of the strap be of any other metal than iron. Brass, however thick, is brittle, and not to be depended on. To this D or ring of one hobble, in the common method, a very flexible strong rope is well fastened by a noose, and, according to the side the horse is to be thrown on, this hobble is to be fixed on the fore foot of the contrary side, and from that to the D of the hind foot of that side, then to the other, and, lastly, through the D of that on the other fore foot. After this, much of the ease and safety of the *throw* depend on bringing the legs as near together as possible. This should be done by gradually moving them nearer to each other, without alarming the horse, which will very much facilitate the business, and is really of more moment than is generally imagined. A space sufficiently large should be chosen for the purpose of casting, as some horses struggle much, and throw themselves with great violence a considerable way to one side or the other; and

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[*] A machine of a very complicated structure, but well adapted for the purpose of restraining the horse in any necessary position, is detailed at length by Hurtrel d'Arboval. It was originally given by Fromage de Feugré, who has rendered himself particularly eminent by taking up the subject of fractured bones in our animals.

[†] On this subject there is much difference of opinion: it is well known that the resistance of some horses is such, that they will die under the hands of the operator, either by the violence of the irritation overcoming the nervous supplies, and at others by the rupture of some important vessel. More frequently disastrous consequences ensue from fracture of the vertebræ of the trunk, of either the dorsal or lumbar usually: a crack is heard during some violent struggle, and on allowing the horse his liberty, he rises before, but is helpless behind. This has influenced many practitioners to accustom themselves to perform almost all operations in a standing position: by practice they become expert at it, and then advocate this as the best method, and as applicable to every operation; to which many are also led, in cities and large towns, from the want of a convenient space on which to cast the horse. Wherever it can be safely dispensed with, from the dangers detailed, it may with propriety be done; but these dangers are magnified: I must have been present at the casting of some hundreds of horses, and never saw it happen. In most operations there is a chance of a dangerous resistance from the standing horse; in many it is utterly impossible to steady the parts sufficiently, without the horse is prostrate.

this particularly if the feet have not been brought near together previous to attempting the cast. The place should be also very well littered down, first with dung, and next with straw. The legs having been well put together, the assistants must act in concert; one particularly should be placed at the head, which must be carefully held throughout by means of a strong snaffle bridle; another should be at the hind part to direct the fall, and to force the body of the horse to the side which is requisite. Pursuing these instructions, the animal may be at once rather *let* down than *thrown*, by a dexterous and quick drawing of the rope, the whole assistants acting in concert. The moment the horse is down the rope must be fastened; and particularly, the person at the head must keep that secure, for all the efforts to disengage himself are first begun by elevating the head and fore parts; but it is necessary to keep some soft padding under it, or he will rub the eyelids bare by his struggles. Great care is also to be taken that the horse be allowed to breathe freely when down; and that no more time be wasted in the operation than is absolutely necessary, as many horses continue to struggle throughout, and waste themselves much; sometimes fatally. In all these cases endeavour to insure a sufficient number of assistants, and of such as are accustomed to these operations.

Slinging is a restraint also which horses submit to with great impatience, and not without much inconvenience, from the violent excoriations occasioned by the friction and pressure of the bandaging around his body. Graver evils are also brought about by the abdominal pressure: some horses stale and dung with difficulty when suspended; and inflammation of the bowels has not unfrequently come on during slinging. It is, however, forced on us in some cases, as in fractured bones, in the treatment of open joints, and in some other wounds where motion would be most unfavourable to the curative treatment. *Suspension* may be partial or complete. Modes of partial suspension are noticed in *Wounds of the Joints*, and in *Fractures* also. Complete suspension will require the application of pulleys and ropes affixed to the beams of a standing in such a manner, that the whole body of the horse can be elevated without disturbance to his horizontal position, with ease and regularity, to prevent his resistance, which may be further prevented by twitching him when he is in motion. A sling may be formed by making a cradle with a square of strong sacking, two sides of which should be fastened firmly to horizontal beams, or pieces of wood the length of the horse, and reaching a little higher than his back: on this so formed cradle he is to recline; it is therefore necessary that it embraces the belly from his elbows to *his* sheath, or *her* bag. From the hinder part of this envelopment two strong bands should pass up from the belly, one within each thigh, leaving the anus free, by directing itself towards the portion of the sheet-beams opposite the croup: two others ought, in like manner, to extend out before, one passing up on each side of the neck, to be attached to the portion of the same beams opposite the withers. These additional points of contact take off much of the general strain, and also prevent the escape of the body either forward or backward. At the four corners of this cradle, a powerful cord should be placed, which being passed, each through a pulley in the ceiling perpendicularly above, may be used to elevate and let down the animal at pleasure: other cords should also pass to the floor from the lower part of the apparatus, to prevent the vacillation of the body. To obviate the dangers of pressure, the cradle must be well bedded with straw, and, where the circumstances do not actually forbid, it is necessary that he be allowed some respite from slinging. He should, if possible, be permitted to lie down at night; if not, he should be let down occasionally to rest on his limbs: if one limb is so injured, or under such treatment as to forbid its approach to the ground, splint it up, and let him support himself on the other three; and, likewise, as he gets weary, draw the sling so as to let him partly rest on that, and partly on the ground.

VETERINARY OBSTETRICS.

The *natural* process of foaling is noticed in the Physiology of the Female Organs of Generation, p. 245: the *artificial* process is, fortunately for horses, not often required, although they are so much more the objects of strict domestication than horned cattle, who very frequently require assistance. Protracted and difficult parturition does, however, every now and then occur, when it becomes the veterinary practitioner to be *au fait* at rendering assistance, or he will be completely under the lash of the farriers around him. The principal cases that occur arise either from weakness in the mare from previous illness, low keep, &c., or from a very considerable disproportion between the fœtus and mother. I have seen a few false presentations also, but of the back and croup only: that of the back required much labour to change for the hinder extremities; and had not the fœtus been a very small one, I must have proceeded to embryotomy, which was, on the part of the owner, much wished to be avoided, on account of the mother having been covered by a small Arabian. When either from debility of the mare, or disproportion in the size of the foal, a natural birth is despaired of, the practitioner, stripping off his coat, tucking up his shirt, and having well oiled his hand and arm, should carefully and gently introduce it into the uterus, expanding its orifice as he proceeds by the opening of his fingers one after another. Having introduced it completely, and having ascertained that the presentation is a natural one, if the feet are conveniently placed, draw them gently forward, and then endeavour to place the head between them. If the head only is met with, seize it by the muzzle and draw it gently onward, searching for the feet, and drawing them one after the other in the line of the head; which manipulations are, of course, only to be attempted during the throes of the mother. When the obstruction is extreme, it will be necessary to introduce both hands, and, as soon as the head and legs are got near the external orifice, enclose them with a rope: or, a more obstetrical method is, to use a pair of forceps, although it is often found more assistant to use a cord round the pasterns of the fœtus, because we can get assistance to aid us in our exertions to liberate the foal, which must be done by steady, but not brutal pulling, at the time of each foaling throe, unless by protracted labour or excess of debility they have altogether ceased, when proceed to extract without: to delay it, would be to lose both mother and offspring. The blunt hook is sometimes used on these occasions, when neither the hand nor forceps can be introduced; but when the foal is of as much consequence as the mother, it is an objectionable instrument; when otherwise, then it is a powerful aid in hands that will direct it so that it shall not fix itself in the parts of the mother. When the obstruction arises from an unnatural presentation of parts, that is, of other parts than the head and fore feet; as of the loins, the croup, and one single extremity, the other being doubled backward, it is evident here our endeavours must be directed to change the position to the natural one, if practicable; if not, to bring the hinder extremities forwards, and make the extraction by this method. Lastly, if all these means fail, we must proceed to lessen the fœtal mass by embryotomy.

EMBRYOTOMY.

When, from weakness on the part of the mother, monstrosity on the part of the foal, or a very narrow pelvic opening, no efforts can bring the fœtal mass away entire, it must be dismembered. A curved, blunt-pointed, strong bistoury, having the blade concealed between the fore and middle finger, with the haft lying within the hollow of the hand, or directed up the sleeve, is to be carefully passed up into the uterine cavity. We are told that, occasionally, hydrocephalus in the colt prevents the head from passing. I never myself met with, or actually knew, an instance of the sort; but the French authors notice it. Such a case will detect itself by the volume that will be felt on examination, and which will be easily lessened by plunging the point of the knife in the forehead, and evacuating the contents by pressing the skull in, when, holding by the muzzle, the head may be brought through the pelvic opening readily. But it is usually the natural size of the head which forms the obstructing mass; in which case the head itself must be lessened by means of the bistoury, by masses taken from around, particularly the ears and flesh at their base; the under jaw may also be separated. When the head has been thus lessened and brought away, it will be necessary probably to contract the volume of the chest also, which will not be difficult, by cutting the cartilaginous portions of the ribs, detaching the thoracic viscera, and then crushing, or rather moulding, the empty thorax together, when, by the introduction of the fingers, or by the hook, the remainder of the body will offer little obstruction. When the head cannot be got at, the limbs must, one by one, be detached: after which the body, and at last the head, may be drawn out either entire, or lessened considerably.

CASTRATION.

This practice, both as regards the deprivation of the male and female animal of their generating power, is of very ancient origin; and, as regards emasculation, is as extensive as ancient. It is founded on the superior placidity of temper it gives, and the restraint it offers to the full development of the form of the stallion. When we consider that the brute resources are principally confined to, and almost equally centered in, two grand objects, preservation and propagation, we cannot therefore wonder that, when they become confined to one of these objects only, very great alterations are to be expected, in both the moral and physical condition of the animal. The castrated horse no longer evinces the superiorities of his masculine character, but sinks much below the level of his fellows, and approaches the softer form and milder character of the mare. Losing his ungovernable sexual appetency, he submits to discipline and confinement without resistance; and if he be less worthy of the painter's delineation and the poet's song, he is valuable to his possessor in a tenfold degree by his acquired temperance and docility. Grant, also, that his outline is less grand, that his crest is less high, and his mane less flowing, has he not gained by the change? In England, where length in the arms of the wide-spread angle in the limbs of our horses is absolutely necessary to fulfil the intentions of the rapid travelling so much in vogue among us, the exchange of the lofty carriage and high action of the stallion is necessary to the end; and when to this is added the lessened tendency of the gelding to some diseases, as hernia, founder, cutaneous affections, &c., we may be content to leave the sexual type with the racer for his breed, and with the drayhorse for his weight, and the fancy of his owner. It certainly is very poetical to lament the degradation of this noble animal; but the finest flight of imagery on one's tomb, after being worried to death by a stallion, would not repay the loss of riding through life on a temperate gelding*. Presupposing it, therefore, eli-

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* I cannot, therefore, but be surprised at the observant Hurtrel d'Arboval, who in true *masculine* language, which it would *emasculate* to translate, thus mourns over the stallion's immolation: 'Si la castration est quelquefois une nécessité, il n'est pas moins déplorable qu'on en fasse un abus, surtout à l'égard du cheval, le plus noble de nos animaux domestiques, celui dont on obtient tout par la douceur et les bons procédés. C'est par la douceur qu'on le façonne au menége, aux évolutions militaires à la guerre, aux allures et aux exercices sans nombre qu'on peut désirer de lui. Cette douceur est elle que le cheval entier, sous la main d'une femme, même celui qui a goûté des jouissances amoureuses, se laisse monter et conduire à merveille, et obéit à tous les mouvemens qui lui sont imposés, malgré toutes les recontres qui peuvent le tenter. Pourquoi donc flétrir ce bel et utile animal par une horrible mutilation? pourquoi lui ôter l'ardeur, la force, la vitesse, même la sûreté des jambes, et toutes belles qualités que lui assurent les organes de la génération, et que rien ne peut suppléer, pas même l'excellente nourriture et tous les soins minutieux des Anglais.' This is an instance how even a great mind may become the slave of prejudice: in the face of so many proofs of the necessity of this operation, and in the general practice of his own country on saddle horses, which are those most immediately the objects of our personal intercourse, it is not a little remarkable that he should thus further indulge in these false sympathies: 'Le cheval hongre n'a plus, des ressorts de la vie, que ce qui est nécessaire pour sa triste existence; il n'a plus ce superbe hennissement qui décèle les élans de sa force et les impressions qu'il reçoit dès l'aurore de son existence: il devient lâche, faible, insensible: il est plus sujet aux maladies, et donne une jouissance bien inferieure pour quiconque sait la gouter.'

gible to castrate our horses, what is the proper age for the operation?
next, what are the relative advantages and disadvantages of the different
thods of performing it? The proper age to castrate the young horse
depend on circumstances, as on his present appearance and growth, and
future purposes we intend him for: observing, generally, that the more
it is done, the safer is the operation: for until these organs begin to form
masculine secretion, they are purely structural parts, and as such are no
intimately connected with the sympathies of the constitution. It is other
when they take on their secretory office: they are then functionally enga
their vascularity and volume is greatly increased, and they are largely sy
thised with by the system, which participates with whatever disturbs th
always considerably, sometimes seriously and fatally. On the other han
removal before the adult age has so much effect on the external form, tha
has occasioned, in some countries, a legal enactment to prevent it; it is s
France, I believe.

A reference to our anatomical detail will shew that a partial descent of
testicles takes place soon after birth, and that in most cases, therefore,
may be found *without* the external abdominal ring, closely packed in the u
part of the scrotum[*] until the fourth, fifth, or sixth month, and occasion
even longer. After this time they are drawn up within the inner and o
rings, probably with a view to prevent their too early development, which w
be prejudicial to the general growth of the frame: here they remain until
tenth or eleventh month. Colts, therefore, can be castrated any time betw
the first and fourth month: and this period is preferred by some persons, f
the little disturbance it occasions in the constitution: and the little chec
gives to the growth would serve, in some cases, to recommend it, particul
where there was a remarkably stubborn refractory disposition known to exi
either parent. Some breeders of horses castrate at twelve months: others
ject to this period, because they think the animal has not sufficiently recov
the check experienced from weaning before this new one arrives. In the
common sort of horses used for agricultural purposes, it is probably indiffe
at what time the operation is performed; this consideration being kept in v
that the earlier it is done the lighter will the horse be in his fore-hand, and
longer it is protracted the heavier will be his crest and the greater his we
before, which in heavy draught work is desirable. For carriage horses it w
be less so, and the period of two years is not a bad one for their castra
The better sort of saddle horses should be well examined every three or
months, particularly at the ages of twelve, eighteen, and twenty-four mon
at either of which times, according to circumstances or to fancy, provided
fore-hand be sufficiently developed, it may be proceeded with. Waiting lo
may make the horse heavy: but if his neck appear too long and thin, and
shoulders spare, he will assuredly improved by being allowed to remain *i*
for six or eight months longer. Many of the Yorkshire breeders never *cut*
two years, and think their horses stronger and handsomer for it: some
even longer, but the fear in this case is, that the stallion form will be too pre
minant, and a heavy crest and weighty fore-hand be the consequence; perh
also the temper may suffer. Young colts require little preparation, provi
they are healthy and not too full from high living; if so, they must be somew
depleted, and, in all, the choice of a mild season and moderate temperatu
proper. When a full-grown or aged horse is operated on, some further pre
ration is necessary. He should not be in a state of debility, and certainly
in one of plethora: in the latter case bleed, lower his diet, and it would
prudent to give him a purgative. It is also advisable that it be done when
influenza rages, as I have found the effects of castration render a horse

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[*] It is this close attachment to the mouth of the external ring, where they are firmly held by
partial development of the chord, which has led authors, and even M. Girard, into describing the
altogether abdominal organs until the sixth or seventh month; and cases are not wanting where
really are retained there until the time of their natural descent, as other instances occur where on
both never appear at all.

obnoxious to any epidemic. The temperature of the atmosphere also should range between 45° and 60°, and I would recommend the advanced spring season, but previously to the flies becoming troublesome, for the performance in all valuable horses; and that it be not done until *after* the winter coat has been shed, which will have a favourable effect on the future *coating* of the horse[*], independent of the circumstance, that at either period of change the constitution is not in a state for any unusual excitement, and that also the check to it might not only prevent a healthy coat that season, but in some measure influence it ever after. Castration is performed in various ways, but in all it expresses the removal of the testicles: there are methods of rendering the animal impotent without the actual ablation of these organs; for if by any other method the secretion of the spermatic glands is prevented, from which the uncontrollable sexual excitements arise, our end is answered.

Castration by cauterization is the method which has been principally practised among us; and as it is that taught at our alma mater, we may naturally suppose it has proved worthy of the patronage it has received. It is that I always practised, and was successful with it. But this by no means proves it the best; on the contrary, many of our most expert veterinarians do not castrate by this method. Mr. Goodwin, as we shall have again to note, never castrates by cautery; neither would I recommend the junior practitioner to commence his castrations by this method, although I can aver I never had an untoward case in it; and the more, as, when I was called on to perform it, it was usually on adult horses, mostly on aged ones. Other plans may be still better: it is my duty, assuming, as I do, to be a teacher, to bring them forward to view, that they may be compared together[†]. A preliminary observation should be made previously to casting, to see that the horse has no hernia or rupture: such cases have happened; and as in our method we open a direct communication with the abdomen, when the horse rises it is not improbable that his bowels protrude until they trail on the floor, on which distressing circumstances see note below*. As unbroke young horses are the most usual subjects of this operation, and such often as have not yet been bridled, or even haltered, but really making good the simile, are '*as wild as young colts*,' to direct the younger practitioner to cast such a one in the usual method, would be much below the regularity of the cook's directions, as entered by that renowned operator in gastronomy, Mrs. Glasse, who sagely directs us first to *catch* a hare, and then proceeds to instruct us in the dressing of it. After this great pattern, we must say something about *catching* and *tackling* the colt also; and take a little from our own stores, and something more from the well-furnished ones of Mr. Percivall, who seems, like myself, to have experienced the difficulty of the matter. This however would never occur were the recommendation I have so often given to breeders and others attended to; which is that of *handling* every colt from his very foaling, by which he might always be caught and readily tackled. If a colt cannot be enticed with oats, &c., he must be driven into a corner between two steady horses, where, if a halter cannot be put on, at least a running hempen noose can be got round his neck; but whichever is used, it should be flat, or the struggles, which are often long and violent, may bruise the neck.

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[*] It is observed in India, that all horses castrated immediately previous to the cold weather, that is, when the constitution had prepared itself for the formation of a long coat to meet the season, such horses retained the habit, and afterwards in winter became long coated; whereas, those which were castrated at the commencement of the hot season retained a coat throughout the year more like that of entire horses, which it is known changes but little by season. The same observations have been made here also, though, as the rigors of our climate are much greater than in India, both the castrated and uncastrated with us submit to the laws of necessity, and form a covering adapted to their wants; but the constitutional heat of the stallion still supplying him in part, the castrated colt also retains the habit of his sire in this respect, but in a less degree here than there; but he does retain it somewhat.

[†] It cannot fail to have struck most practitioners, that, in all the mechanical operations of human and brute surgery, there have sprung up individuals, usually illiterate ones, who, devoting themselves thereto, have acquired a manual dexterity that has misled the public to employing them in preference to the more enlightened professor of the art; and thus, while human surgery presents its corn cutters and its tooth drawers, our art can furnish gelders or horse-cutters and spayers, who beat the regular veterinarian out of the field. Ignorant of probable consequences, they proceed fearlessly, and so proceeding, they become expert, and are thence sought out, to the exclusion of the regular practitioner of the art, except upon some extraordinary occasion; when the prudent caution displayed in his proceedings, instead of benefitting him, is arrayed in an invidious comparison between his method and that of lame Jack the cutter, 'who would have done it in half the time, and drunk a quart or two of beer into the bargain.' It is really a matter of some surprise, however, when we mark the expedition and adroitness with which some of these persons perform this mechanical part of the art, as every veterinarian must have had opportunities of observing, sometimes probably to his mortification as well as surprise. Witness the following: in my very earliest outset as a veterinary practitioner, I was sent for from Lewes to fire a valuable hunter, belonging to J. Bean, Esq., of Alfriston, Sussex. It was my first essay in firing on my own account; and *fired* as I was with my wishes to signalize myself, I laboured to enter my novitiate with all due honour. The farrier of the village was ordered to attend—a sturdy old man, civil enough, but looking as though impressed with no very high respect for a *gentleman farrier's knowledge*. The horse was cast, I dare say awkwardly enough, and secured, as will appear, even more so. I however proceeded to shew the superiority of the new over the old school. I had just then left the Veterinary College, not as a pupil, but as a teacher, which I only mention to mark the climax. On the very first application of the iron, up started my patient, flinging me and assistants in all directions from him, while he trotted and snorted around the yard with ropes, &c. at his heels. As may be supposed, I was taken *aback*, and might have gone *back* as I came, had not the old farrier, with much good humour, caught the horse around the neck with his arms, and by some dexterous manœuvre brought him on his knees, when, with a jerk as quick as unexpected, he threw him at once on his side, where our immediate assistance fixed him, and we proceeded. It is needless to remark, I retired mortified, and left the village farrier lord of the ascendant. As regards castration, I am convinced that not only are superior expertness and great quickness acquired by the frequency of the practice among these persons, but that even the safety of it is also, in some degree, promoted by it in the ordinary cases which occur; and so impressed have I ever been with this opinion, that whenever I have been myself applied to to perform it, I have always answered, that the country persons who devoted themselves to it were so much more expert at it, that I conscientiously recommended an application to some one of them. But there are circumstances, even in these almost straightforward cases, which the enlightened few at once see as probable; and duly appreciating the importance of, apply in preference to the veterinarian, of which I had once a flattering instance. While residing in London, I received a letter desiring to know what would be my

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charge to take [illegible] journey to a [illegible] county to castrate an aged horse, and to remain with him two days, to [illegible] I stated [illegible] I could, which, as I was then engaged in a full and lucrative practice, [illegible] not [illegible], at the same time I observed in my answer, 'that in such a [illegible] as that from which I was addressed, I felt assured expert cutters [illegible] would [illegible] perform the operation with far more dexterity than myself [illegible], that it had not been found that the practice of regular veterinarians [illegible] of castration had exhibited any proofs of greater safety than that of the country cutters.' I had done what I thought was proper, and I expected to hear no more of the case; [illegible], however, brought me a letter to the following effect: 'That my charge was not at all objected to, and I was requested, if possible, to put myself in the mail the same evening; and that, as to the [illegible] I had mentioned, I was thanked for my candour, but the owner of the horse [illegible] were many [illegible] and accidental circumstances that might occur, both during the operation, and in the after-treatment of an aged and valuable horse, which all the dexterity of a country cutter might not be able to cope with; and further, that if any thing adverse should happen, he (the owner) should have nothing to blame himself for.' I went my journey, the horse was operated on, and [illegible] without [illegible] symptom. From a non-professional hand I thought this an excellent lesson, and most certainly it well advocates the veterinarian's practice, by its reference to these contingencies. Is the common cutter often a judge of the growth of a foal, so as to be able to state the proper time for the operation? Is he the fit person to give directions as to any necessary preparation he may require, and particularly should the horse be full grown or aged? Provided he should meet with [illegible] but one testicle in the scrotal bag, what would he do? Or are there others [illegible] should [illegible] out? and should peritonitis threaten, or extensive outward inflammation follow, succeeded by abscesses and sinuous sores, is the case then in good hands? And yet these and many other evils attend the operation when performed on the young even, and much more frequently on the older and aged.

* Hernia as a consequence of castration may also occur by the *uncovered* operation, which, as already observed, makes the scrotal sac and the abdominal cavity one continuous open hollow. It is not to be wondered at, therefore, if the violent struggles of the animal should force a quantity of intestine through the opening into the scrotal bag. Should we be called on to operate on a horse which already had hernia, it is evident that we ought not to proceed with it, unless the owner be apprised of the risk, and willing to abide by it, which a diseased state of testicle or uncontrollable vice might make imperative. In such case I would recommend that the method of Girard be practised, i. e. to remove the testicle, and then to enclose the tunica vaginalis within the clams (sufficiently tight to retain them and it, but not to produce death in the part) pushed high up against the abdominal ring, very carefully avoiding to enclose any portion of intestine in the operation. When a discovery is made of the existence of hernia *after an opening has been already made* for the *common* purposes of castration, would the operator continue his process, and castrate? I should say, by no means; but on the contrary, I would greatly prefer the method recommended by Mr. Percivall, to firmly unite the lips of the external wound by the quill suture, allowing the testicle itself to assist in blocking up the passage, with a hope also that the inflammation produced by the excision might altogether stop up the scrotal communication with the abdomen. But in the appalling case of immense protrusion of intestine, what is to be done? I would here advise the junior practitioner not to lose his self-possession, but to command himself, and while he is energetic in endeavours to relieve, that he keep his mind as free as possible from fright and despair; and above all, not to *shew* what he dreads. Mr. Coleman, in such a case, proposes to make an opening into the abdomen near the umbilicus, large enough to introduce the hand, and draw in the bowels. Mr. Percivall would prefer dilating the external ring, but which from what I have observed I fear would fail, though in some cases it might be tried with seeming propriety: but the testicle must be very firmly retained, and even permanently fixed against the dilated ring, or the bowels would again descend. The intestines probably would become inflated in any such case; these I would certainly puncture by the finest possible point: I would then endeavour to *return* them, as directed in wounds of the abdomen, p. 411; which not succeeding, I would then pursue Mr. Coleman's method, and endeavour to *retain* them by M. Girard's plan.

and produce abscess or poll-evil. When his exertions have tired him, he may be then led to the operating spot: here his attention should be engaged while the hobbles are put on, if possible; if not, a long and strong cart-rope, having its middle portion formed into a noose sufficiently large to take in the head and neck, is to be slipped on, with the knotted part applied to the counter or breast, and the long pendant ends passed backwards between the fore legs, and, as expressed by Mr. Percivall, 'extended obliquely backward, carried round the hind fetlocks within the hollows of the heels, brought forward again on the outside, passed under the collar-rope, and a second time carried backward on the outer side of all, and extended to its full length in a direct line behind the animal.' Thus fettered, Mr. Percivall says his hind feet may be drawn under him towards the elbows; I have, however, often found that, at the moment the rope touches the heels, the colt either kicks and displaces the rope, or altogether displaces himself; but his attention can generally be engaged by one fore leg being held up, or by having his ear or muzzle rubbed, or even by the twitch: if not, the rope may be carried actually around each fetlock, which then becomes a hobble; and this rope may be gradually tightened: in this way I have succeeded with very refractory colts; but it requires very able assistants, and, if possible, the man who has been used to the individual colt should be present. In either way, as soon as the rope is fixed, with a man to each end of it behind the colt, let them, by a sudden and forcible effort in concert, approximate his hind legs to his fore, and thus throw him. Before the colt is cast, however, it should be endeavoured to ascertain that he is free from hernia: with an adult horse this is even more necessary.

Being satisfied that no hernia exists on either side, proceed to cast the horse, turning him, not directly on the left side, but principally inclining that way; and if possible let the croup be very slightly elevated: it is usual to place him directly flat on the left side, but I have found the above rather most convenient. Next secure the near hind leg with a piece of hempen tackle, having a running noose, or, in default of this not being at hand, make use of the flat part of a hempen halter, which should for safety be put on before the hobble of that leg is removed, as may be readily done if the hobbles having shifting or screw D's, as described in casting, are made use of. A left-handed operator would incline the horse to the right side, which is a caution of Hurtrel d'Arboval's, and a very good one; for I once saw a young left-handed practitioner, who, not choosing to depart from the usual rule, was rendered very awkward by the circumstance, exactly in the same way as the young accoucheur feels himself, both being thus fettered by the sinister side of his patient, when a little promptitude on the part of both would convince them that, if their practice was *right*, the use of the most convenient side could not be *wrong*. Every requisite being at hand, and as Hurtrel d'Arboval, with his usual minuteness observes, the operator, having his scalpel between his teeth, should place himself behind the horse, as the most convenient way to perform his manipulations, and firmly grasping the left testicle with his left hand[*], and drawing it out so as to render the scrotum tense, he should make an incision[†] lengthways of the bag, from its anterior to its posterior part, or, as expressed by Hurtrel d'Arboval, in the direction of the grand axis of the organ. The incision may be carried at once through the integuments, the thin dartos expansion, and the vaginal coat of the testicles, by the dexterous operator, with a sweep of the scalpel: but with one

[*] This part of the operation is sometimes rendered rather difficult by the force with which the cremaster muscle retracts the gland towards the abdomen; to remedy which Hurtrel d'Arboval recommends tapping his sheath or penis, striking his nose or lips slightly with a whip, which diverting his attention, allows the testicle to be drawn towards the operator. Mr. Percivall says, to avoid this great resistance, the testicle and its coverings may be included between the clams; and certainly, when these are not injuriously pressed, this must be the best method.

[†] Some operators prefer the heated iron for this purpose, on the principle that it prevents the flow of blood from the scrotum from obstructing the view of the after-operations. The cauterized wound, it must be observed, inflames most, and is longest in healing; and if we could suppose the inflammation might prove a derivative one, it would certainly lessen the tendency to one deeper seated and more important, as that of peritonitis, &c., as well also as it obviates any fear of partial union of the divided scrotal edges by adhesive inflammation, which does occasionally occur. In my own practice I have always used the knife; and I should certainly recommend it in preference to the other.

less *au fait* at the operation, it will be more prudent to make the first incis
through the scrotum and dartos only, to the required extent, and then to
the same by the vaginal coat, thus avoiding to wound the testicle, which wo
produce violent resistance, and give unnecessary pain. We however take t
opportunity of noting, that cases have occurred when the tunica vaginalis v
divided no testicle followed; firm adhesions between this tunic and the tun
albuginea having retained it fast. In such case the scalpel must be emplo
to free the testicle. See a case of this kind noted in the first vol. of *The Vete
narian*, p. 275. When no such obstruction occurs, the testicle, if the open
be sufficiently large, will slip out; but the operator must be prepared at t
moment of so doing to expect some violent strugglings, more particularly if
attempts to restrain the contractions of the cremaster, and by main force
draw out the testicle. Preparatory to this, therefore, the twitch should be tig
ened, the attendants, especially the man at the head, must be on the ale
and the testicle itself, at the time of this violent retraction of the cremast
should be merely held, but not dragged in opposition to the contraction, oth
wise peritonitis itself might be the result from any such violence. If the cla
have been put on over the whole, according to Mr. Percivall's method, they w
assist in retaining the retracting parts; but I must again offer a caution, th
they be not used with too much pressure. The resistance having subsid
provided the clams have been thus employed, they must now be removed;
if they have not been previously in use, they must now be taken in hand, an
being wadded with tow, should be placed loosely on the cord, while time
given to free the *vas deferens*, or spermatic tube, which is seen continued fr
the epididymis, from the grip of the pincers. The Russians, Mr. Goodwin
forms us, cut it through when they operate. Hurtrel d'Arboval does not n
it in the French practice: but humanity is much concerned in its removal fr
pressure, from the excess of pain felt when it is included. It it also necessa
before the final fixing of the clams, to determine on the part where the divisi
of the cord is to take place. To use Mr. Percivall's words, 'If it be left t
long, it is apt to hang out of the wound afterwards, and retard the process
union;' indeed, I have known the end of it swell into a fungous excrescen
which greatly embarrassed the practitioner to destroy: on the other hand, if
be cut very short, and the arteries happen to bleed afresh after it has been r
leased from the clams, the operator will find it no easy task to recover it fr
the retraction of the cremaster. The natural length of the cord, which w
mainly depend on the degree of the descent of the gland, will be our best gui
in this particular. The place of section determined on and marked, close th
clams sufficiently tight to retain firm hold of the cord, and to effectually st
the circulation within it. There are now two modes of making the divisio
the one is to sever it with a scalpel, and then to sufficiently sear the end of it s
as to prevent a flow of blood, avoiding, however, to burn it to a cinder, as
sometimes done. The other, and in some respects the preferable method,
to employ an edged firing-iron, which is to divide it by little crucial sawings, s
that, when the cord is separated, it shall not present a uniform divided surfac
but ragged edges, which will more perfectly destroy the mouths of the vessel
and tend to lessen the chances of hæmorrhage. This done, loosen the clam
sufficiently to observe whether there be any flow of blood; gently wipe the en
of the cord also with the finger, as sometimes an accidental small plug get
within the vessel, which afterwards is forced out, and therefore had better b
removed by this means and at this time. Retain a hold on the clams a few minutes longer; and while loosening them gradually, observing to have an iron i
readiness again to touch the end of the cord, if any blood make its appearance
Satisfied on this point, sponge the parts with cold water, but by no means dasl
it over them, as has been done; neither is any external application necessary
still less any resin seared on the end of the cord, which can only irritate an
will never adhere. On the after-treatment much difference of opinion has existed, and even yet exists. The powerful evidence of accumulated facts has
now convinced veterinarians of both the necessity and propriety of some motion

for the newly castrated horse as a preventive of local congestion: such practice is common in most countries but our own, and seems salutary in all. Hurtrel d'Arboval, thus impressed, recommends the horse, immediately after the operation, to be led out to walk for an hour, and it is a general plan in France to walk such horses in hand an hour night and morning. Mr. Goodwin, in proof of its not being hurtful, informs us that whole studs of horses brought to St. Petersburgh to be operated on, are immediately travelled back a certain portion of the distance, night and morning, until they arrive at home. I have, therefore, no hesitation in recommending a moderate degree of motion in preference to absolute rest, as practised among us: it is a plan which has long been followed with success among our own cutters; and perhaps our not adopting it before has arisen from prejudice against whatever was practised by illiterate persons, without reflecting that, illiterate as they are, their employers are not all so; and that unless success attended their practices, they would cease to be employed.

The French method of castration is advocated by Mr. Goodwin; and it is sufficient that it receives his recommendation to entitle it to the attention of the veterinary world; and it is rendered the more so, as he observes on the method in general use among us, 'that the operation performed by the actual cautery always induces, more or less, symptoms that often become alarming; and that it cannot be performed on the adult without incurring more swelling and severer symptoms than attend any other method of operation. If I ever use the actual cautery, it is for the sake of expedition, and then only on a yearling, or a two-year old; but I am resolved never to employ it again on an adult.' These observations, as emanating from such a source, must be deemed important, and, in attempting a description of the most eligible methods, I should not fulfil what is due to this reputed author and practitioner, as well as to those who are likely to be improved by his account of it and his remarks on it, were I not to give it somewhat in detail. Mr. Goodwin first offers the description of the French method of operating from Hurtrel d'Arboval. 'Castration by means of the clams is the method in general use, if not the only one now employed; it is the most ancient, since it was recommended by Hieroclius among the Greeks. It is performed in two ways, the testicle being *covered* or *uncovered*. In the former, the scrotum alone, formed by the skin and dartos muscle, is cut through, and the testicle is brought out by tearing through the laminated tissue which unites the scrotum with the tunica vaginalis; and the clam is then placed above the epididymis, *outside* the peritoneal covering, on the cord. In the uncovered operation, the incision is made through the serous capsule of the testicle; the tunica vaginalis being cut through, the testicle presents itself, and the clam is placed well above the epididymis, on the cord. Some persons recommend the epididymis to be left under the clams, with a view of the animal's keeping his strength and vigour: in young subjects this may be done without inconvenience, but in older it is often the cause of mischief. The operation, performed in either way, requires us to provide ourselves with a scalpel, a pair of clams, a pair of long pincers, made purposely to bring the ends of the clams together, and some waxed string. The clams may be made of different kinds of wood, but the elder is, nevertheless, the best, and generally made use of. To make a clam, we procure a branch of old and dry elder, whose diameter should be about an inch, and whose length should be from five to six inches: of course, the dimensions must at all times be proportioned to the size of the chord we have to operate on. At the distance of half an inch from each end, a small niche, sufficiently deep to hold the string, must be made, and then the wood should be sawed through the middle lengthways. Each end of the clam should be planed, so as to facilitate the opening of them, either when we are about to place them or to take them off. The pith of the wood is then to be taken out, and the hollow should be filled with a paste made of corrosive sublimate and flour, mixed with sufficient water to form it. Some persons are not in the habit of using any caustic whatever, and, of course, the scooping out of the inside of the clam is not necessary: notwithstanding, the caustic, inasmuch as it produces a speedier dissolution of the parts, must be useful, and ought not to be neglected.' The addition of the caustic, however, Mr. Goodwin objects to with great reason, remarking, that unless it be a very strong one, and necessarily dangerous to employ, it cannot be of any use to parts compressed and deprived of circulation and life. He further informs us that he has operated in six cases in succession with the same effect, without any escharotic matter whatever. An experimental case of Mr Percivall's terminated fatally: by the use of caustic the cord was greatly inflamed, as high as the ring, and which unquestionably produced the unfortunate result. 'The covered operation,' continues Mr. Goodwin, 'is the one that I am about to advocate, and which differs only inasmuch, that the scrotum and dartos muscle must be cautiously cut through, without dividing the tunica vaginalis. It was Monsieur Berger who was accidentally at my house when I was about to castrate a horse, and who, on my saying that I should probably do it with the cautery, expressed his surprise that I should perform the operation in any other way than on the plan generally approved of in France. Being a stranger to it, he kindly consented to preside at the operation, and, after seeing him perform on the near testicle, I did the same on the right, but of course not with the same facility as Berger. After opening the scrotum, and dissecting through the dartos, which is very readily done by passing the knife lightly over its fibres, the testicle and its covering the tunica vaginalis, must be taken in the right hand, while the left should be employed in pushing back the scrotum from its attachments; and, having your assistant ready, as before, with the clam, it must be placed well above the epididymis, and greater pressure is, of course, necessary, as the vaginal covering is included in the clam*.

Castration by *excision* of the testicle has also been practised in the same manner as it is done in the human subject; but so performed in the horse, there is a tendency to propagate inflammation through the rings into the abdomen, and they frequently die of peritonitis. Mr. Cline lost two valuable carriage-horses which he operated on himself in this way, and this result is so common, that Mr. Bell notices it in his Lectures†. Mr. Goodwin observes, however, that in Russia he has seen hundreds of horses operated on this way safely; and he remarks it certainly produces less pain, the animal loses less flesh and condition, and is sooner recovered than when operated on by the actual cautery.

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* Such is the acount of this method offered by Mr. Goodwin; and he follows it by a very candid statement of its disadvantages, and its cases of failure both with himself and with others, but which ends in his preferring the close or covered method, from a consideration of the liability which the common operation incurs, of occasioning an irreducible escape of intestine from the unnatural position the animal is trussed in, and the violent efforts of the abdominal muscles at such times; an accident which, to his knowledge, has occurred in several instances to very able practitioners, when fatal consequences were the result. 'It is the knowledge,' continues Mr. G., 'of several cases that have terminated fatally, through the escape of intestine, and particularly in race horses, that has chiefly induced me to prefer the close or covered operation. Mr. Jewell lost a valuable race horse of Mr. Vansittart's. *Crown Prince* had an accident of a similar nature occur to him when operated on by a Mr. Atherton, of Liverpool. Mr. Field can best inform you of the case of *Leopold*, a horse belonging to the late Duke of York; and Lord Kilbourne's *Reviewer* lost his life last year in a similar way' Hurtrel d'Arboval's opinion of the close operation is as follows: 'Castration, by the close operation, is more expeditious, and for this reason is, no doubt, preferred by a great many practitioners. This method has its advantages as well as disadvantages. It is less painful, and does not expose the animal to a hernia, which is but of too frequent occurrence in well-bred horses, that are consequently irritable, and make violent efforts during the operation. It facilitates the placing of the clam well above the epididymus, a circumstance that is important, for pressure on it is almost sure to produce subsequent disease in the cord. On the other hand, this operation is more liable to be *the cause of tetanus*, and of *peritoneal inflammation*; and the substance of the cremaster muscle prevents the compression being made effectually. Nevertheless, we find practitioners who, having operated in this manner, and without accident, upon thousands of horses, according to their assertions at least, do not hesitate to affirm, that castration by the close operation is less dangerous, and merits the pre-eminence which their experience accords to it.' On these objections of Hurtrel d'Arboval Mr. Goodwin remarks, and with much apparent justice, that he cannot imagine why tetanus should occur more frequently after the covered than the uncovered operation; and pressure certainly may be made as efficient, if our instruments are well adapted for the purpose, in this operation as in the other; for, in fact, there is but one objection that, I think, has the least foundation for our consideration, or rather our experience, which is, the statement that *peritoneal inflammation* is often the consequence of it.'

† 'Fatal inflammation is apt to ensue by castrating horses after the method practised by human surgeons: the reason is, that the peritoneal coat, that coat which the testicle carries down with it, in the human subject closes and degenerates into cellular texture, but in the horse it is open, and therefore you see the difficulty of that operation. In the case of the horse, in cutting off the testicle you open the cavity of the abdomen, but you open it in a small extent, yet that extent is sufficient to create inflammation; being once inflamed, that inflammation going on, passes, from the sympathy I have alluded to, over the whole of the surface of the peritoneum, and destroys the creature.'—*Lancet*, No. 207.

Castration by ligature, called among farriers and breeders *twitching*, is a painful, barbarous, and very dangerous practice: and consists in enclosing the testicles and scrotum within a ligature until mortification occurs and they drop off. It is practised by some breeders on their young colts, but it is always hazardous, and disgracefully cruel. The substance of the testicle in some countries is also broken down either by rubbing, or otherwise by pressure between two hard bodies: this is practised in Algiers instead of excision, and tetanus is a frequent consequence of it. Lastly, I would notice the simple division of the *vas deferens*, which has been performed, it is said, with success on many animals, and is proposed as a safe and less painful process for the emasculation of the horse. It consists in a longitudinal section, with reference to the horse when cast, through the scrotum, dartos, and vaginal sheath, so as to expose the cord, from which the vas deferens is to be separated and severed. I should be inclined to view this in the same light as the retention of the epididymis to retain the spirit, i. e. the vice, for so it proves. There is a certain consent of parts by which the sympathy of an organ remains after its functional offices are *apparently* destroyed: the human castrati has erection, can copulate by the additamentary secretions from the prostates and vesiculæ seminales; and I make little doubt but the nervous excitement would continue, in a certain degree, were any portion of the testicle to remain. There are certain nice conditions of the organ necessary for propagation; thus the horse who retains his testicles within his abdomen, possesses all the riggish qualities of him with one perfectly evolved: he is lustful, and can cover, but is seldom fruitful. Of the morbid consequences of castration I have little to say: by early evacuations, green food, a loose box, a cool air, moderate clothing, but particularly by walking exercise, swellings of the parts may be prevented: if not, bleed and foment; and should suppuration follow, and sinuses form, treat as directed under those heads; and should there arise tetanic symptoms, refer to that article.

LITHOTOMY.

Although there are a few instances on early record wherein this operation was successfully performed on the horse, and some within our own times, yet, until that which engaged Mr. Sewell's attention appeared, the veterinary public had not seemed interested in it. I have already treated on vesical calculi, where I made much use of the learned Parisian professor's valuable memoir, as it appears under review in *The Veterinarian.* I now draw on it again as the most accredited source of information on all abstruse points in our surgery. Hurtrel d'Arboval's account of the progress of lithotomy in veterinary practice commences in 1774, although we are led to suppose it had been once previously practised. This second case was successfully operated on by Mons. Del: in 1794, Porncelot; in 1808, M. Bouley; and at other periods, Texier, Girard, Le Gay, Verrier, and Sêgala, have also performed it. 'In monodactyles there are two methods of operating for the stone, one through the rectum, the other through the bladder. The first, which consists in laying open the bladder by a longitudinal incision made through the parietes of the part of the rectum adherent to it, by means of a straight bistoury, is easily practised, but in its consequences is dangerous in the extreme: in fact, it is an operation never to be adopted but in a case where the magnitude of the stone precludes its extraction through the neck of the bladder. In all other cases, lithotomy by the urethra is to be pursued. For its performance are required, a straight long-bladed bistoury, a fluted sound, and a pair of forceps curved at the extremities. The animal should, if practicable, be maintained in the *erect* posture. It is a good preparative, inasmuch as it facilitates the operation (though not absolutely a necessary one), to distend the urethra with warm water. This being done, and the tail plaited and carried round on the right quarter, the operator makes an incision from above downwards, an inch and a half to two inches in length, on one side of the curvature of the urethra, opposite to the ischial arch. Next, he pushes the point of the bistoury into the urethra, making a small opening, through which he introduces the sound, and passes it onward into the bladder. Now, placing the back of the bistoury within the groove of the sound, by gliding the knife forwards, the pelvic portion of the urethra, and also the neck of the bladder, become slit open; the latter in two places, in consequence of a second cut being made in withdrawing the bistoury. The opening made being considered of sufficient dimensions, the operator introduces the forceps into the bladder, and seizes the calculus in the direction of its long axis, which he ascertains by the other hand within the rectum. The forceps clasping the stone are now to be withdrawn, but with gentleness, and with a vacillating sort of movement of the hand from side to side, in order more easily to surmount any difficulties in the passage, and the more effectually to avoid contusion or laceration.' Here the ingenious reviewer remarks, 'The warm water is intended as a substitute for the whalebone rod which we pass into the urethra; and we are inclined to augur favourably of the practice, as far as we can estimate it on paper: to say the least of it, it is worth a trial, the introduction of the rod being, now and then, an affair of no small difficulty.' To proceed, however, with the operation by incision, M. Girard tells us, 'That the cut through the pelvic portion of the urethra ought always to be made obliquely to one side; that the operator should hold his bistoury in that direction, that its cutting edge be turned towards the angle of the thigh. By this procedure we shall gain easier access to the bladder, and not only avoid wounding the rectum, but also the artery of the bulb, as well as the bulb itself, and suspensory ligaments of the penis.' The parts cut through in the operation are, '1st, the fine thin skin of the perineum, smooth externally, and marked with the raphe; densely cellular internally: 2dly, adhering to the skin, the *faschial covering*, derived from the faschia superficialis abdominis, which is here become fibrous: it forms the common envelope to the parts underneath, and is closely connected with the corpus musculosum urethræ: 3dly, *the corpus musculosum urethræ*, that penniform band of fleshy fibres which springs by two branches from the ischiatic tuberosities embracing the sphincter ani, and concealing the arteries of the bulb; whence they unite, and proceed to envelope the urethra: 4thly, *the corpus spongiosum urethræ*, the part immediately covered by the muscular envelope, and which here is bulbous. It is more particularly worthy our remark, from two arteries penetrating it, which come from without the pelvis, ascending obliquely outward to reach the bulb; 5thly, *the suspensory ligaments* of the penis, pursuing the course of, and adhering to, the tendinous union of the accelerators.' 'An attention to the relative position of these parts,' says the translator, 'will demonstrate the advantages of the lateral oblique incision over one made directly along the raphe: by pursuing the latter, we necessarily cut through the suspensory ligaments and into the bulb, wounding thereby the arteries; whereas, by the former, all this danger is avoided, besides that it renders the operation more simple and facile.'

TRACHEOTOMY.

Cases occur in veterinary practice when this operation is required; as in strangles, when the tumours threaten suffocation, or when any substance has remained unswallowed in the esophagus, the pressure of which obstructs respiration. In a distressing case of gunpowder bursting immediately under a horse's nose, the effects of which tumefied his mouth and nostrils, so as to prevent free inspiration, the animal owed his life entirely to my excising a portion from the tracheal rings, about six inches below the angle of the throat. The operation is a very simple one, and may consist either in a longitudinal section made through two or three of the rings; or a portion, occupying about an inch square, may be excised from the anterior cartilaginous substance, and which latter is by far the best method: the integuments should be first divided in front of the neck three or four inches below the obstruction, and the integumental section should be sufficiently long to allow of their being retained back by a hook to each side, to which tape should be attached and tied on the crest of the neck above. This is however only to be pursued when the obstruction is likely to remain but a few days: when a more lengthened one is probable, a tube adapted to the size of the trachea must be introduced, having an acute turn and a projecting rim, which must furnish holes for the adaptation of tapes to secure it around the neck[*]. The operation has been also performed in cases of roaring, under an idea of dividing the stricture which impeded respiration; but unless the exact situation of this were discovered, it would be but an uncertain attempt. When an opening is made into the upper part of the trachea, or larynx, it is called *laryngotomy;* which is not quite so simple an operation, but is fortunately very seldom requisite. It consists in dividing the integuments exactly opposite the cartilaginous box of the larynx, so as to bring the cricothyroid ligament into view, which should be sufficiently divided either to remove any offending substance, or otherwise to admit a respiratory tube.

ESOPHAGOTOMY.

It was long thought that a wound in the esophagus must be necessarily fatal, but we have now sufficient proofs to the contrary on record, so that we are not deterred from cutting into the esophageal tube when it is necessary; but only when it is absolutely so, for it is an operation requiring skill and anatomical knowledge; and its future results are also often very troublesome, sometimes very serious. The cases that call for esophagotomy are the lodgement of accidental substances within it. An apple once so lodged was removed by incision by a veterinay surgeon at Windsor. Carrots, parsneps, beet, &c., are liable to produce such obstruction when not sliced. Too large a medicinal mass also has lodged there; and a voracious eater has, by attempting to swallow too large a quantity of insalivated bran or chaff, produced an obstruction which has so pressed on the trachea as to threaten suffocation. Esophagotomy is also called for by stricture of the tube, a case of which, very judiciously and successfully treated by Mr. Cheetham, V.S., is detailed in the 3d vol. of *The Veterinarian.* In all cases of obstruction of this kind we will suppose that a probang well oiled has been previously attempted to be passed, and has completely failed. The operation determined on may be practised either when cast or when standing: I should prefer casting the horse, from the necessary caution required in dissecting among such important vicinages, in which case the choice of side to lay him on, will depend on the case. As the esophagus is known to incline somewhat to the left side of the neck, the common choice would be the right side; but when an obstructing mass protruded itself mostly towards the right side, it would be bad surgery to open the tube but on that side. We will, however, suppose the horse cast on the right side, with the muzzle part of the head rather extended, but not sufficiently to produce any flexure of the neck. It will also be necessary to command a good light. The part of the neck chosen for the opening must of course be governed by the obstructing mass; but should circumstances not dictate any precise spot, about the centre of the cervical region is a proper one, the proximity to the thorax lessening the difficulties and the dangers. A section should be made through the integuments and cellular tissue, at the inner border of the trachea, carrying it within the track of the jugular to the extent of between three and four inches. An assistant should now hold separate the integuments, and at the same time slightly compress the jugular, which by enlarging it will render it less likely to be wounded. The tissues met with in the large space intended for the enlargement of the esophagus during the passage of food are to be dissected through, within which district lie the carotid artery and numerous lesser arterial ramifications. The recurrent nerve passes between the carotid artery and trachea: about the middle of the neck, and nearly in the same vicinage, passes the par vagum on each side. The pulsation of the carotid will guide the practitioner as he approaches that vessel, and that will enable him to steer clear of the nerves, and, by carefully letting his assistant sponge the parts as he makes each light section with his scalpel, he may reach the esophagus with safety; which being done, pass under it a crochet or any hook-like matter, as a bent horn, which will further bring it to view for a longitudinal incision through its muscular and cuticular tunics. The end gained for which the opening was made, is it or is it not to be left open? There are different opinions on this subject: I should prefer closing it up, from the danger of forming sinuses by the escape of the aliments taken in; and it may be closed either by the interrupted suture, as directed in the last edition, or in preference by a number of small contiguous ligatures, each having, instead of a common knot, a small piece of tow, &c , by which a pressure would be kept up favourable to union, and preventive of the escape of the knot by ulceration. The after-treatment should be, to interdict all dry food; thick gruel may be horned down, or will probably be taken voluntarily, on which the animal should subsist for three, four, or five days. If the condition appears to suffer much, allow malt mashes, and when so doing watch the wound; and if the matters taken in are seen to ooze out, wash them away frequently with warm water, to prevent lodgement, which might encourage sinuses to form; and after each washing syringe with some very mild stimulant, as a weak solution of sulphate of zinc (*white vitriol*), &c. &c.

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[*] Moderately stout leather, such as is used for calf-skin soles for ladies' shoes, might be sewn into a tubular form, and polished smooth without; and also be fitted with a piece of horn. as the angular portion to adapt to the external orifice. Leather would be pliant, and less likely to irritate than any metal. The powder puffs of former times, which exhibited a leathern tubular case stretched around a spiral wire, would also furnish an idea for a flexible tube of this kind. An ingenious mechanician might also in two or three hours make an elastic gum tube, similar to the elastic gum catheter, but of a size nearly equal to the trachea.

PARACENTESIS THORACIS (see page 393).

PARACENTESIS ABDOMINIS (see page 396).

NEUROTOMY,

OR DIVISION OF THE METACARPAL AND PLANTAR NERVES.

THAT this operation did not at first engage much attention in France occasions some wonder, when we consider the readiness with which this enterprizing people lay hold of and enlarge on any real improvement; and it can only be accounted for by the want of success which attended the operation on its entrance there. Heiman, a horse-dealer, was one of the first who practised it, which he did on his own horses; and by an improper selection of cases he *unhoofed* as well as *unnerved* most of those he experimented on. It was tried also at both the Alfort and Lyons veterinary schools, but made no ground at either; and it is asserted, that it was never publicly mentioned by any of their professors except by M. Huzard, jun., when reviewing the last edition of the VETERINARY OUTLINES. Even Hurtrel d'Arboval, whose industry collects from every quarter, is entirely silent on a practice now so frequent and so notorious here. As M. Berger, however, through the medium of the *Journal Pratique*, has published an account of what he saw during a visit to this country three or four years ago, when the opportunities afforded him were considerable, as well as of his own subsequent experiments from which a favourable result ensued, we may suppose it will not long thus remain unpractised by them; which appears the more likely, as M. Dupuy also acknowledges its merits. Our neighbours, like ourselves, have been led into a fear of the effects of the operation on the vitality of the foot, apprehending that by dividing the plantar nerves they should cut off all the pedal supplies, arterial as well as nervous, and consequently that they should render the foot an inorganic and useless mass, which must necessarily then fall off. And the cases of failure which followed in such quick succession from its improper application, tended to confirm them in their suspicions, and to prevent any extensive or even fair trials of it afterwards. Well as the French physiologists understand the anatomy and functional characters of the nerves, great as was the avidity with which the new doctrines were received by them, they never appeared to have applied them to this subject; and while they fully recognised the great features of the new system, which divided the nerves into three separate and distinct kinds, as those of sensation, those of motion, and the ganglionic or nutritive, yet they seem not from thence to have considered, that, in the case of neurotomy, the one might be severed without other loss than that of feeling; while it was an interference with the other which alone could produce a destruction of the structure of the foot. Distinctly as this was known and acted on with us, yet the native acuteness of our neighbours appears here to have failed them, and thus they have been led to totally condemn the practice of neurotomy from confined views, and by the want of success of a few experiments conducted on wrong principles. Perhaps we ought not, however, to be surprised at this; for it was long before we also were fully sensible of its benefits, although brought before us nearly thirty years ago: on the contrary, we also allowed the plan to fall into a long and deep sleep; and exactly the same reasons have influenced both us and them, because neither had informed themselves on the rationale of its action, and because both attributed the cases of failure which occurred, not to occasional *causes*, but to the *principles*, which operated on the whole. I well remember on my first introduction to Mr. Moorcroft, by my old friend Bloxam, at that time residing with him, that a very principal subject of our conversation was, his experiments on the feet, *particularly as regarded rendering such as were incurable more serviceable by making them less sensitive;* which he had been before attempting by tying up the pastern *arteries*, but was now employed in *dividing the nerves* of the same part. I equally well remember then detailing to him the series of experiments on which I had been engaged with the late ingenious Dr. Haighton, on the reproductive power of nerves (see note, p. 162), by which incised portions became first re-united, and next capable of transmitting the nervous influence as before. How far his future views or practice might have been influenced by these facts, I am not aware*. Previous to entering further on the operation of

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* When we compare the originality of the idea and the boldness of the measure of dividing the nerves as a remedy for lameness, with the then confined state of our knowledge of the separate functions, we cannot but lament that circumstances should have removed such a man as Mr. Moorcroft to a climate whose enervating influence was calculated to repress that ardour for research which had characterised his early days. If he did so much when his views of these organs were thus limited, what might not have been expected of him, had he been then in possession of our present knowledge on the subject? for a reference to his interesting and explanatory letter, in the year 1819, gives full reason to suppose that even then the distinction between nerves of sensation, motion, and nutrition, was not familiar to him. That his early experiments were wholly made under different views is apparent from his whole letter; but which is, nevertheless, a most instructive one, and full of practical truths, as well as valuable inferences. Its intent is evidently to establish his claim to the discovery of neurotomy; which he commences by informing us, that twenty years ago (his letter is dated 1819) he had been sedulously attempting to detect the cause of lameness in the fore feet of horses, which was so frequent and so destructive, and which it had been formerly common to attribute to an affection of the shoulder, but more lately to simple contraction of the hoof; to which Mr. Moorcroft admits he was more instrumental than consisted with future experience; 'for this experience,' to use his own words, 'shewed, that although the removal of the contraction, in some instances, wholly removed the lameness, in others it totally failed. In some cases it appeared, that a contracted state of the foot was itself an effect of other injury, though when existing in a great degree it tended to increase the lameness. The removal of contraction was effected by more than one process; but no process was found capable of removing, permanently, certain kinds of lameness. On dissecting feet affected with these lamenesses, the flexor tendon was now and then observed to have been broken partially or entirely, but more commonly to have been bruised and inflamed in its course under the navicular or shuttle-bone, or at its insertion into the bone of the foot. Sometimes, although seldom, the navicular bone itself has been found to have been fractured: at others its surface has been seen deprived of its usual coating, and studded with projecting points or ridges of new growth, or exhibiting superficial excavations more or less extensive. It is acknowledged that those parts which, in their healthy state are endued with a low degree of sensibility, are greatly tenacious of sensibility when excited beyond a certain point. A man with a bruised or inflamed tendon can place it, wherever situated, in a state of rest favourable to the dispersion of inflammation; but this is not the case with the horse when the flexor tendon of his fore foot has been injured and inflamed, for this tendon not only supports, passively, a certain proportion of the weight when the animal is standing and at rest, but actively, whenever the limb is put into the slightest motion; and the horse cannot possibly place the tendon in a state of repose and inactivity, except during the time he lies on the ground, and it is subject to pressure, invariably, both in his lying down and getting up. This constant exposure to pressure, in addition to the nature of the parts injured,

neurotomy, we will review the sources of the phenomena by which it
lessening *sensibility* without destroying *mobility* or *vitality*. A reference
physiology of the nervous system will shew that there are three variet
nerves furnished from the brain: that two of them are commonly found
together in one rope, but yet remain unblended either in substance or o
such are those destined to supply *sensation* or *feeling*, and those that in
motion: the third are the *ganglial*, whose office is the *nutrition* of parts:
usually surround the bloodvessels in a reticular manner. These nerves a
exhibited by a correct anatomical figure of the foot, and are characteris
cording to their several and varied uses, by Mr. Youatt, in No. 4. of t
brary of Useful Knowledge, p. 111, to which we would recommend tha
attention be paid to understand the rationale of the operation and its
tive effects. It is worthy of remark, that while nothing is wasted i
body, nothing is withheld these varieties of nerves are supplied wh
they are wanted: and as long as all these wants, as sensation and moti
main in the same organ, the same nervous rope can furnish ramifications o
kind. But when it so happens that either of these is unnecessary, that n
may be lost in the system, the nervous portion destined to that end is wit
On this simple view hangs the theory of the benefits derived from *Neur*
or the division of those very parts that heretofore were considered as the
spring of all the vital supplies. If we examine the leg of the horse, we
find that the muscular structure, by which the motion of the limb is ope
does not reach below the carpal bones of the knee: so far are the nervous
of the part compounded of united fibres of *sensation* and *motion*, and no fu
They are now not wanted, and therefore are not given, but the *sensation*
part is yet required, and therefore the continuation of the nervous rope
of sensation, but of sensation only. The *nutrition* of the part is carried
means of the ganglial nervous twigs, which surround the bloodvessels: the
do not at all interfere with in our operation of neurotomy.

To render this anatomically as well physiologically clear, let us trace
nerves from their origin. The radial and ulnar branches, as being de
from the axillary plexus, are necessarily compound nerves of motion and
sation: as they descend along the radius (the former furnishing the inner
latter the outer metacarpal nerve), the motor portion of each is separated
the sensitive, and are wholly spent on the muscles: the metacarpal nerves
ing now sensitive only, travel down on the inner and outer edges of the
tendons, in company with the arteries and veins of the same name. Each
tacarpal nerve, be it particularly remarked, immediately previous to its
ing over the fetlock-joint, gives off a considerable ramus, which passes dir
in front of the foot, to furnish sensibility to the anterior parts of the o

renders inflammation permanent, and prevents coffin-joint lameness receiving permanent relief.
horse, indeed, guided by his feelings, relieves the tendon temporarily, in a degree, from pressur
pain, by pushing the foot forwards, raising the heel, and throwing a large portion of the weight
fore part of the body on the opposite or sound leg. By this expedient, however, the heels
diseased foot, through not being kept in action by the direct pressure of the limb, gradually app
each other, and the foot becomes smaller on its outer circumference, and narrower and more h
on its lower surface; whilst the fetlock joint of the opposite leg, distressed by an over-proport
weight, frequently inflames and thickens. Foiled in attempts to remove coffin-joint lamene
removing contraction through mechanical contrivance, modifications of temperature, and v
actions of medicated applications, I was led to consider some less usual mode of diminishin
vital activity of the parts injured. It was remarked, on dissecting coffin-joints thus diseased,
they were surrounded by a much greater proportion of bloodvessels, and that these were
more distended with blood than the same vicinity of coffin-joints uninjured. It was determ
therefore, to lessen the quantity and force of the blood supplied to a diseased coffin-joint, by ty
the fetlock-joint one of the two arteries that carry blood to the foot; for by having tied one
carotid or large arteries of the neck, the progress of inflammation of the brain was arrested, an
horse recovered; and before I understood the principles on which the cure of the spongy s
the foot called canker ought to be conducted, I had tied a fetlock artery in view of che
immoderate discharge of fluid, and with beneficial effect. One fetlock artery was accordingly t
several cases of coffin-joint lameness without any benefit. But as I had, in a single instance
both the carotids in inflammation of the brain, and the horse recovered and was as useful as befo
attack, I thought it justifiable to push the principle of diminishing the supply of the mater
inflammation as far as practicable in coffin-joint lameness, by tying both the inner and outer art
the fetlock. In no instance, however, were the horses subjected to this operation benefitted, b
the contrary, contraction of the foot seemed to be hastened thereby, and lameness to be proporti
increased.'

From this it becomes evident, that, when we excise these nerves *above* the pastern, we *totally* deprive the foot of *sensibility;* but when we do it from *below*, we leave sensation to the *front of the foot*, to the *coronet*, and *lateral cartilages.* Thus, were we to operate for the relief of ringbone, we should, without fail, do it *above* the pastern, otherwise we should not benumb the pain and tenderness in the diseased part; and from these mistakes have arisen many of the failures which have occurred: it has also happened, that, in some of these, the cause being suspected, the operation was repeated *below*, when the desired *insensibility* was produced, and removed the lameness. The mere division of the nerve, without removing a portion, was the early practice, and led to unfavourable results; for in these cases the divided portions pour out a coagulable matter, which hardens, becomes organized, and not only re-unites, but enables the nerve again to transmit the phenomena of sensation as before*. As this nervous power is usually regained in a few weeks, it follows, that horses thus operated on become again lame; and this, of course, tended to bring the operation into disrepute. Extended views and conclusive experiments led to the separation of these divided ends beyond the reach of union, by altogether *excising a portion of nerve* of three-fourths of an inch in length. Such, however, are the wonderful powers of re-production in the constitution, that even this space has in every instance been filled up, and sensation has also returned in most of them, at indefinite periods; in some of which, the lameness has not again appeared, a proof that, occasionally, it has a remedial effect. In most, however, with sensation, lameness also returns: but a repetition of the operation again removes it; and, in some, sensation never re-appears†. It will therefore be evident, that valuable as is this discovery, it is yet a limited one, and is confined to particular cases, while in some it is even prejudicial: it consequently remains to inquire, what are these particular cases? and here I much fear our knowledge is yet more limited than the operation; for as we cannot look into the foot, nor are there pathognomonic symptoms sufficient, in many cases, to enable us to decide to what extent the ravages within have disorganized it, or whether such processes of disorganization are still actively going on, it is difficult to mark the cases proper for it with any precision. There are particular cases of groggy lameness, where little more is seen *without* than partial con-

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* 'It will be seen from these experiments, in the first place, that after a division of a nerve, the extremities of the divided portions (retract) become enlarged and more vascular, but especially the upper portion; and coagulable lymph, having the appearance of white of egg, is effused, which soon becomes vascular. In a few days the coagulable lymph from each portion becomes united, and anastomosis forms between the bloodvessels; the coagulable lymph gradually assumes a firmer texture, and the number of the bloodvessels diminishes, and the newly-formed substance appears to contract, like all other cicatrices, so as to bring the extremities of the divided portions nearer and nearer to each other. It is difficult to determine, from an experiment on the limb of an animal, the exact time at which the nerve performs its functions. In eight weeks after the division of the sciatic nerve, I have observed a rabbit to be in some degree improved in the use of its leg, but at the end of eighteen weeks it was not perfect. When the nerves of the leg of a horse have been divided just above the foot, they are sufficiently restored to perform their functions, in a very great degree, in six or eight weeks; but it must be observed *that these nerves are only formed for sensation*, and it is very different with the nerves of voluntary motion.' 'The re-union is sometimes accomplished by granulations.' 'Secondly, I would observe, that punctures and partial divisions of nerves heal in the same way as when there has been a total division; and that on the first infliction of the wounds the functions of the nerve are very little impaired.'—*Swan's Dissertation on the Treatment of Morbid Local Affections of Nerves.*

† This restorative process is the more remarkable, for, according to the observations of Mr. Swan, although the renewed communication seems accomplished in the same way as when there had been a simple division, yet the appearance of the interposed portion was not such as to lead to a supposition that the nerve would ever be again functionally restored. Accurate dissections, and very minute examinations of the intersecting nervous bulb, which occupied the space between the divided portions of the nerves of dogs again restored to sensation and motion (for such they were), in the experiments of Dr. Haighton, I remember presented a mass of exquisitely fine parallel fibres. Something of this kind may be also seen in the connecting knob, where simple division was made of the metacarpal nerves of the horse, but which is, as far as I have observed, not distinguishable in that lengthened portion which fills up the break in the present mode of altogether removing a piece of the nerve Mr. Sewell has observed, that sensation is restored in about two months after, when the nerve has been simply divided; but when an inch has been removed, the return of sensation cannot be dated with any precision: in one case he found it had not returned in three years. The feet of a cast horse belonging to the Royal Artillery was sensible of a prick at the end of two years; and I have seen a case where sensation and lameness again appeared in something more than eighteen months, at which time the horse was again operated on: three years and a half afterwards sensation had not returned; I then lost sight of him.

traction; but where progression is rendered painful to the animal, and u
sant as well as unsafe to the rider, from exostosis or ulceration of the
lating membranes, which forces the horse to suspend much of his weig
firmly contracting his extensors, before he is willing to call his flexors i
tion, thus forcing on himself a stilty gait, as though the bony pieces
limbs were nearly perpendicularly opposed to each other: and in a certa
gree they are so; for Mr. Turner has shewn that there is an actual as
the coffin-bone within the hoof, which drags with it the navicular bone.
results follow from a contraction of the hoof of a particular kind, whose
toms, according to his account, are 'circularity, solidity, compactness o
and an unusual appearance of strength: the heels are high, the sole stron
the crust thick, particularly at the toe: but it sometimes loses its du
portion of obliquity, and becomes rather more upright than natural.
is, however, a more certain indication, which usually presents itself:
falling in of the inside quarter, or slight indentation about the middle
crust towards the heel: this sometimes assumes the appearance of a stri
in a slight degree, all round the crust; and occasionally two or three of
strictures or rings are apparent. Thus much may be observed without t
moval of the shoe; but the protrusion of the frog within the foot, to
with the morbid concavity of sole, may not be discoverable till the dra
knife has been extensively employed, not only on the sole, but in exca
those channels or commissures on each side of the frog, between it an
bars. An inordinate growth of sole and other parts of the foot, by prese
prominent surfaces, too often conceal from our view the encroachment
consequent diminution of the horny cavity.' This description is intend
lead to a judgment of the existence of navicular disease (see also p.
Now, in the early stage of this complaint, or, indeed, whenever it had n
attacked the under surface of the navicular bone, as by its ravages to hav
dangered the safety of the insertion of the flexor perforans, it is evident t
would prove a most essential benefit; but, unfortunately, as remarked by
fessor Dick, 'the ulceration of the under surfaces of this bone is such, i
vere and protracted cases, that, after the nerves have been divided in the
ration of neurotomy, it happens frequently that the friction between the
dons and the navicular bone completely divides the tendinous insertion,
the pastern falls to the ground.' These cases, therefore, are among tho
which it would be most injudicious to neurotomize: for if the separatio
not occur, then it would most likely do so hereafter, when the horse, no l
sensitive to concussion, battered his injured feet without the restraint o
natural guard to injudicious exertion; for unquestionably pain was give
the warning monitor when we were making an improper use of our organs.
how are we to judge of this particular state? I know of no actual sign to
tinguish it. I should, however, in no case perform the operation if the j
were stiffened in any degree, or become very perpendicularly inclined: ne
would I recommend it if there were signs of actual inflammation, unless I
led to suspect that the heat arose from vascular re-action, the effect of si
contraction of the hoof, brought on by any of the occasional outward ca
which produce this lessening of its diameter: in such case I would pare and
the foot a few days, and then proceed to operate. In the pumiced foot
the warning voice of pain being removed, the neurotomized horse, in every
stance, soon batters the remains into a useless disorganized mass: in these c
it is always hurtful; but in cases of ringbone, and in those groggy lamene
connected with ossification of the lateral cartilages, it offers a valuable pallia
and where a disease of the foot has terminated in partial anchylosis, it does
same; for here the use of the part must prove beneficial instead of hurtfu
in pumiced feet. As far as my own experience goes, those cases are the l
benefitted by it which are the result of acute founder, terminating in conges
and diseased alteration of the laminated structure, with a tendency to ossi
tion of the laminæ. Neurotomy, in such instances, I have found to be
frequently pernicious, and followed by the loss of the hoof. Mr. Castley, a

ingenious writer in *The Veterinarian*, appears to consider, that it succeeds best when only one foot is the subject of lameness, and where organic disease has existed, but with little contraction of hoof.

Neurotomy has now stood the test of very extensive application: the annals of our writers offer innumerable proofs of its restoring almost useless animals to a state of much utility, and of saving an infinity of pain and suffering to a valuable and patient servant of man. And if there are chances that it may occasion such injury as to hasten the end of some horses, it is usually in such as the disease would have done the same at no very distant period: under which presumption it might be worth the trial, even in the most adverse cases: it is imperative almost whenever we have reason to consider that the morbid processes are not now in a state of activity, which is by no means an unfrequent case. Having stated thus much in its favour, it must not be supposed that I recommend it as an unqualified benefit, even where it succeeds best. No neurotomized horse ever after goes exactly with the same freedom as before, nor with equal care and safety: the indifference to the nature of the exertions, and to that of the ground gone over, is such as to have fractured the legs; it is quite common to batter the feet to pieces; and although horses have hunted afterwards with desperation, and hacknies have carried their riders with determined perseverance long distances, yet it is altogether more calculated to prove beneficial to carriage than to saddle horses. This I believe to be a just statement of its merits, as assisting the horse as a locomotive animal; but there are benefits it offers to the animal of a more extensive and constitutional kind. Those gained by the bodily system generally have been in some cases very marked: thus, an aged and crippled stallion, from the irritation constantly kept up, became so emaciated as to be unable to fecundate; but being relieved from a constant state of suffering by neurotomy, improved in health and condition again, was used to cover, and became the sire of healthy colts afterwards. It happened, also, that a mare similarly circumstanced ceased to feel the periodical œstrum, or horsing; but after neurotomy it again returned, and she resumed her character of a brood, and not a barren mare. It also appears likely to add to our remedies for tetanus, by cutting off the communication between an unhealthily disposed wound and the brain; and it appears in these instances also to act with most certainty when a *portion* of the irritated nerve is *excised*. One case has actually occured where the tetanus, occasioned by a wound in the foot, was arrested and removed by neurotomy. It also promises much in the painful state of some cankers, where the irritation has rendered the application of dressings almost impossible: here, by depriving the foot of sensibility, we deprive the horse of that which at once injures him and us: the sore itself is often amended by it; but in every instance the dressings can be effectively applied, and the healthy processes cannot be at all suspended by it. It remains to add, that although neurotomy, as I have shewn, did not originate with Mr. Sewell, yet it is to him we are indebted for its being brought prominently forward, and it is wholly to him that we understand the full rationale of its action. His extensive experiments on it have given it its proper rank in the scale of benefits to the animal and acquisitions to the art: it will, without doubt, be always inseparably connected with veterinary practice, and equally so with his name, '*Palmam qui meruit ferat.*' Mr. Sewell, I believe, still perseveres in recommending the lower incision; that the horse may retain a portion of sensation in the front of the foot, as a warning against the improper use of it. Mr. Goodwin, on the contrary, who introduced it into the late king's stables with decided advantage, I believe prefers the upper section[*]: such

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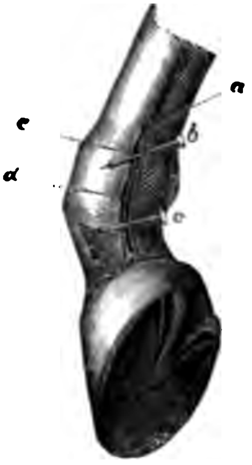
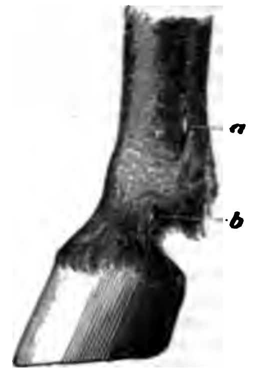
[*] If I am not mistaken, the benefits resulting from it in these stables were marked by the restoration of some very valuable horses to great usefulness: Mr. Bloxham mentioned to me two particular favourites that had been so benefitted. Altogether, the statements of Mr. Goodwin are of much weight, not only from his known experience and veracity, but also because, at the time when his valuable work came before the public, he appears not to have been at all prejudiced in favour of the operation: it seems also to have rather grown upon his good opinion by his subsequent observations, which much enhances its value. His account is marked with great candour, which has been too much wanting between the disputants on the subject; and while he notes the hoofs which have sepa-

preference, however, ought to be under the guidance of circumstances,
intensity and the seat of the disease, of which I have before treated
operation commonly leaves, for a considerable time, some enlargement
the spot, the effects of the adhesive matter interposed between the sever
tions, which has occasionally been so considerable as to interfere with p
sion, by its aptitude to become struck by the contrary foot, but which
remedied by a little invention of bandage. This circumstance has, howe
some practitioners, when it has been wished to make the upper section,
to avoid the chance of *interfering*, to operate on the metacarpal nerve
outside, and on the pastern or plantar on the inside.





DESCRIPTION OF THE FIGURES.

Fig. 1st represents an off fore leg with the integuments removed.—
commencement of the incision, which exposes the inner metacarpal nerve
behind the vein and artery. *b*, A pin separating and elevating the nerve
part intended for the upper section. *c*, The continuation of the nerve ov
fetlock, and here called the plantar or pastern nerve; the anterior branch
furnishes the front of the foot is not seen in the view, but is given off just
this. *d*, The inner plantar or pastern artery, which in a natural state
close to and before the nerve. *e*, The inner plantar or pastern vein ante
the artery.

Fig. 2d represents a leg with the integuments entire.—*a*, The situation
section through the skin in the high operation. *b*, The situation of the
section.

Mode of performing the Operation.

The situation of the section through the skin being determined on, a gu
which may be gained from *fig.* 2; cast the horse, and having firmly secure

rated from the feet by it, he remarks that in most instances the horses themselves were not e
use previously; so that it was little more than the *loss* of the operation—the animal was us
bad as *lost* before. The following extract from his work is of great practical importance: ' it h
stated, that the hoof and foot waste after the operation; but I am glad to know that this obse
is imaginary. I have observed, in hoofs where the operation has been performed, a more plentif
duction of horn than before, and a greater disposition to grow in the natural form: and I think
a consequence to be expected; as the irritable state of the foot being destroyed by the division
nerve, the secretion of the horn is likely to go on more freely. When the operation has been per
before any considerable change of structure has taken place, I have no doubt that the original
is removed altogether, by the animal being enabled to bear the full proportion of weight on th
foot.'

leg to be first operated on, shave, or otherwise very closely cut, the hair from the part, which having done, and having ascertained the exact course of the artery by its pulsation, make a section in that direction, be it either above or below the fetlock joint, inclining a little behind the vessel, through the integuments, one and a half or two inches long. The cellular substance being cleared away will bring the vessels into view, and the nerve will be readily distinguished from them by its whiteness. Elevating it from them, and from its membranous attachments, by means of a tenaculum, or by a crooked needle armed with thread, pass a bistoury under it, as near to the upper angle of the section as may be. The violent spasm which the section produces may be somewhat lessened by first pressing the nerve between the finger and thumb, when an opportunity may be taken, either with the scalpel or with strong surgical scissors, of dividing it; when, firmly holding the lower portion between a pair of forceps, and having detached it from all adherences, with the bistoury or scissors excise about three-fourths of an inch of its trunk. Having finished, if both feet are affected, proceed to do the same with the contrary side of the other leg; in doing which no pain is felt, consequently no one would be so thoughtless as to excise this portion first: after which turn the horse, and repeat the operation on the other sides of each leg as they come in succession, by which a more frequent turning of the horse may be avoided. The integuments may be now drawn neatly together, and either secured by slips of adhesive plaister, or by a few stitches; if by the former method, and they be properly secured by a light compress, it affords the greatest chance of promoting a union by the first intention. Tie up the head for a day or two, after which put on a cradle; keep the horse very quiet and low: give mashes to open the bowels; but I should avoid *physicking*, from the fear that griping might occur, which would make him restless, or probably require exercise: if of a full habit, bleed.

DIVISION OF THE FLEXOR TENDONS.

This operation has long been occasionally practised, principally among farriers of the better order; for few surgically educated would have dared to venture on one apparently so formidable, but which timidity has arisen from want of a proper consideration of the brute resources. Mr. Dick informs us, it had been practised by his father; by a friend of his also, and lastly by himself: and how dexterously, and with how successful a result, a letter from Mr. Castley (who saw it performed) to Mr. J. Turner, to be seen in the 3d vol. of *The Veterinarian*, will testify. In vol. ii of the same valuable work, it will also appear that it had been previously performed with the best results by Mr. Wells, V.S. of Wymondham. These are flattering proofs of the growth of the art among us, and become of much importance to the possessor of animals; for few of us but must have remembered to have met unhappy brutes travelling with a pastern flexed almost to the ground, the weight of the half of the body suspended on the point of the toe. There are so many accidents and so many diseases that may produce contraction of the flexor tendons of the foot, that we only wonder we do not more often meet with them; which we should certainly do, but that the attendants, despairing of being able to afford relief, advise their destruction, a few bold characters excepted, and a few confiding owners at the head of them. The operation consists in making a longitudinal incision of about three inches in length along the inner lateral edge of the tendon, dissecting each portion from its cellular attachments, so as to expose the nerve, artery, and tendon under the anterior flap, and the tendons hidden by the other. This opening will allow the perforatus and perforans to be freed from any connexions, when a division of them should be made by a powerful scalpel applied to the surface of the tendons, while an attendant holds back the integuments; the nerve and vessels being also carefully kept out of the reach of incision. It is evident that this should take place below any thickening, or any adhesions which may have permanently connected the tendon with the neighbouring parts: any lesser attachments will be broken through by the bringing back the just position of the

[illegible] effected by a forcible straightening
[illegible]. By Mr. Dick this was done 'by placing his knee again
[illegible] at the same time laying hold of the foot wi
[illegible] the upper part of the leg with the other, and using considerable
in the same manner as a person would do in breaking a stick; and this ap
to be necessary, in order to break any membranous or ligamentous adh
that may have formed.' The limb should now be placed in a poultic
horse [illegible] blood, it should now be done; and if any fear of
contraction should arise during the cure, thicken the shoe of the foot op
on, and put a patten shoe on the other. Some slight exercise after th
week may be allowed, but previously to that the horse should be confined
box, during which the bowels must be kept open with mashes.

STRICTURES

These contractions are liable to occur in the horse, though he cannot be
sidered as very obnoxious to them. Wounds or bruises have brought the
in the [illegible] the pharynx, larynx, trachea, and œsophagus. Wherever
occur, the [illegible] of a probang daily should first be tried; which h
fail, the [illegible] part must be cut down on, and the stricture divided
treat[illegible] for the purpose of preventing both the reunion o
stricture [illegible], and the interruption of the functions of the part: the
place the [illegible] so as to encourage healing by the adhesive process
less any part of the treatment requires delay.

AMPUTATIONS.

These have been hitherto confined principally to the tail, the ears, and
parts of minor importance in the animal frame; but veterinary surgery
takes a wider field, and the extremities are amputated with a certainty of ma
horned cattle still serviceable for the purposes of yielding milk; and wit
doubt the same might be done with the brood mare, or stallion, particular
fractures of the fore extremities; and also in some instances where a very fav
ite horse or mare was entitled, by some particular claim on the affection, to
tain life under all circumstances. Professor Dick furnishes a case sent to
by one of his pupils to the following effect: 'I performed amputation upon
cow on the 7th of July: after having properly secured the animal, and appli
tourniquet above the carpus, I made a circular incision through the integum
round the leg, a little below the carpus, and having separated the skin so a
allow of its being pushed up a little, I cut through the sinews, and lastly sa
off the stump: the parts are now completely whole, although she has been g
at grass all the time, and, now that she has got the advantage of a cork stu
makes a wonderful shift for herself, and yields a good supply of milk to
owner.' Mr. Dick also notices another case of amputation of the fore leg
two-year old heifer; and of a third, where the hind leg was removed above
tarsus. Such operations have occasionally occurred from time immemorial,
a few enterprising characters. I have myself heard of them, but they were
garded as mere matters of curiosity and wonder, and therefore were not imitat
We shall, however, probably ere long have them more common, in cows at le
for, occurring below the carpus and tarsus, they are as easily performed as ni
ing or docking; and as there is no doubt but that a hollow padded stump mi
be applied sufficient for the support of the animal, such operation, in an eco
mical point of view, might be prudent in many cases. Fractures of the lo
portions of the limbs, with great comminution of bone, considerable ravages
disease within the foot, or extensive gangrene, are the cases which might call
it. Of the method of amputation little need be added to the above. Hur
d'Arboval enters into a very laboured detail of the manner of amputating
various parts of the extremity, from the foot upwards; to which the inquisit

may refer. The principal practical points are, the fixing of a tourniquet of sufficient force, which should be padded to make its principal pressure on the leading arterial trunks, while its general circumference will act on the smaller: no individual flap of integuments will require to be saved, but a ring of about two inches in depth should be obtained by a section below the intended place of operation made through them only, and, when separated from its cellular adherences, should be turned back; and a circular incision may then be carried in a direction a little inclined upwards, as regards the limb, through the muscles, &c., taking up by ligature such vessels, both venous and arterial, as appear in the course of the operation. The section thus made, free the bone from the soft parts by the scalpel, where the adherences are very intimate, and having, by means of a crucial bandage retracted the soft parts altogether above the bone, saw it through. Finally, effectually secure the principal vessels, when, bringing the soft parts over the bone, retain them there by proper bandaging, which keep moistened with Goulard water, and suffer to remain without disturbance until the third or fourth day.

Amputation of the Penis.

Among those removals of parts which become occasionally necessary in veterinary practice, this may be reckoned. Dedelay d'Agier has treated of the diseases which attack this organ, and render amputation necessary. Chabert also describes the operation, and the cases which call for it, as when it is in a gangrenous state; and also when it becomes covered with chancres or with warty excrescences, sometimes with both. In this latter state M. Huzard operated the removal of the penis of a gelding by *ligature*, which seems to have been the only method resorted to at that time. Hurtrel d'Arboval also, when he describes this amputation, says that the immense size of the organ, and the number and volume of its vessels, are such as would render hæmorrhage from it mortal: its removal, therefore, he observes, can only be effected with safety by *ligature*. M. Huzard passed a canula within the urethra, and by ligatures attached to its verge, and carrying it round the body, retained it there. He then applied a strong ligature around the penis, beyond the diseased part, including within it the canula, by which the urinary flow remained unchecked: the ligature was now applied and further tightened daily, mortification followed, and the strangulated part separated from the living on the eighth day. In this way, therefore, the timid practitioner may always remove a diseased penis: but humanity is concerned in performing it by direct section. We are likewise informed that some serious symptoms followed the removal by ligature, as colic, general abdominal inflammation, and disgusting fœtor. These prompted M. Barthelemy, jun., senior professor at the Royal College at Alfort, to attempt the amputation by the knife, a detailed account of which, as read before the Royal Academy of Medicine, is to be met with in No. 5 of *The Hippiatrist*, and a more condensed one, with editorial remarks, in the 1st vol. of *The Veterinarian*. He introduced a canula, and placed a ligature an inch beyond the proposed point of incision. Unexpectedly, as soon as this was made, the remainder of the penis escaped within the sheath, dislodging the canula and removing the ligature, neither of which could afterwards be replaced. No hæmorrhage, however, followed at the time; but at each erection for the purpose of staling some bleeding occurred; so that in the five days which succeeded to the operation it was calculated that fifty pounds of blood were lost. Amputation of the penis is likewise not unknown among us: it has been performed several times at the Veterinary College, where it is found that no canula is necessary to keep open the urethra; the force of the urinary flow breaking down any incipient cicatrization of its orifice. The sheath is first forced back, and the penis brought forward to its greatest possible extent: whatever portion it is intended to remove is now cut through by means of the bistoury, when the remainder is retracted within the sheath, and little hæmorrhage has afterwards occurred, except at the time of passing the urine, as in the case of M. Barthelemy; but in these there appear to have been no alarming quantity of blood lost.

AMPUTATION OF THE TAIL, OR DOCKING

It might be worth inquiry, whether this operation first originated in
position that, by excising a portion of the tail, the hinder quarters were
strengthened; or whether the inconveniences of a flowing tail to the
driver were the exciting causes. Even yet, in some counties and an
particular horses, as those of stage waggons, an idea is entertained that
tional strength is gained by a close curtailment of dock. Neither is it
bable, but that the blood intended for the support of the tail may, to a
degree, find itself other channels, by increasing the anastomosing bran
the surrounding parts. I am not, however, advocating the cause of this c
still less the barbarous and unsightly one of cutting the dock to within t
four inches of the rump; whose benefits are probably a *decepti*
estimated by the eye being at once carried over the expanse of croup an
tocks, whereas in other horses, the line of vision is broken by a d
ordinary length. Neither is the custom of docking colts almost as s
dropped at all beneficial to the future growth of hair on the tail: on th
trary, I was informed by an intelligent breeder in Yorkshire, that the
docked colts had less hair even than others. Mr. John Lawence, wh
practical writer deserves attention, however observes, that the ancient
of early docking may be practised at a month old with a common knif
and is attended with little pain and no risk. It became first objected to
us, because the tail was supposed to extend itself beyond the proposed
It certainly deprives the animal of some defence against flies; but it is s
provided with flowing hair at this period, that this objection is not gr
perfectly agree with those writers who advocate the cause of a longer
than it was heretofore fashionable to leave our hunters, and some of our
sters and carriage horses. Whatever appearance a short tail may have in
the thick-set round bred look 'knowing' and more angular in the cock
surely it detracts greatly from the elegant lines of the better breeds, in
contrast is less wanting than a continuation of symmetrical lines. The
of dock must however be left to choice, but, being previously determin
the long hair should be fastened back from that part, while about an i
two below it should be shorn clear from surrounding hair: to this pa
docking machine is to be applied, which removes it at one stroke. Vario
provements have been attempted in the after-treatment, such as ligatur
rope, tourniquet, pledgets, astringents, &c., for restraining the hæmor
These are all now justly abandoned, and too often originated more in an a
ed sympathy, or wish for originality, than in a just estimate of feeling or c
quences. A mild application of the cautery is unquestionably the safes
probably the most humane mode, as occasioning no necessity for after-torm
however, as it is sometimes applied, it is cruel in the extreme, and cer
totally unnecessary. It is not unlikely that its violence is even sometimes
ductive of the tetanic state which occasionally follows docking, as well
mortification also. We know that sloughing and an ill-conditioned sta
parts are consequences of it; and as the hæmorrhage which follows would
prove fatal, and seldom injure the horse, there is still less necessity for it, c
a second application of the iron with melted resin over it. I need hardly
that the position in which the tail is held when searing can never influenc
future carriage of the tail, though it has been thought to do it when held
pendicularly. In my own practice I always found a moderate pressure of
iron, heated only to a dull red heat, fully sufficient. Every practition
aware that from two or three coccygeal trunks only does much hæmorrhage
with any considerable impetus. Might not these be fired with a budding-
separately, sufficiently to arrest the bleeding, leaving the minor anastomo
branches to restrain themselves? If tetanic symptoms appear, operate a
without restraining the blood, the flow of which may be useful, particular
accompanied with large doses of opium. (See p. 366). If gangrenous app

ances arise, warm terebinthinated dressings on the part, warm fomentations over it, and spirituous applications in the intermediate times, are the principal indications.

NICKING.

There can be very little doubt but that the former operation originated in a wish to prevent the inconveniences resulting from the force with which a horse carried a long tail around him, to the annoyance of his rider; perhaps it was further kept alive by its being apt to be carried over the reins in driving also; tails were therefore first tied up in 'stiff buckle;' and as carriage riding became prevalent, they gradually were altogether shortened or docked; and, lastly, from an observance that, under impetuosity, or stimulated by any excitement, the tail was elevated, or nicked. Animation, which is but another term for beauty and grace, became inseparably connected in the mind with this carriage of the tail, and artificial means were therefore used to make it constant in ordinary exertion. In a natural state, the depressing muscles of the tail are stronger than the erecting, that, by its close application to the anus, it might guard this important outlet. It is to reverse this, and to give the balance of power to the erectors, that the operation of *nicking* is practised. The introduction of blood-horses into general use has greatly modified the mode of nicking, and, instead of three sections to form a perfect *nag-tail*, the drooping pendant elegant curve of the blood-horse requires but one. As in castration, so also with nicking, a seasonable time should be chosen for it: in cold weather, it may become checked in its granulating process; and in very hot weather, tetanus will be more likely to supervene. A temperature of from 55° to 60° will be, therefore a very proper one. The modes of securing the horse for the operation are various. Some few do it in the break or trevis; others place him against a strong bail, across a stall, or a leaping bar; which methods are practised by grooms and horse-dealers, who are often very expert at nicking, and who seldom, if ever, cast a horse for the purpose. Professional practitioners, I believe, most of them, used to throw the horse for this operation: for many years I never operated without so doing; but I became averse to it from the difficulty of making the sections of equal depth, and likewise from the dangers of casting; but more than all, from every day seeing horse-dealers performing it with the greatest ease and security standing. It should, however, be remembered, that unless the practitioner be very expert at using the side lines, and have all the necessary conveniencies, it will be safer for him to operate by casting: for want of these precautions, I remember, a few years ago, a horse-dealer being killed on the spot while nicking a horse one Sunday morning in London.

Mode of operation.—The horse being properly secured (if by the side line, two had better be used), and a twitch being ready for both lip and ear, endeavour to gently place first one, and then the other hind leg, as far under the belly as the horse can bear with comfort, but not farther, or it will increase his disposition to resistance. If it be suspected that he will prove very obstreperous, or any timidity exist in the mind of the operator, as a further security, include both hind legs in another rope, or in a wide web, a little above the hocks. This may either run in a noose, or, which is better, let each loose end be attached to a manger ring, or, if operated out of doors, fasten them around the neck or across the breast. The tail having the hairs of the dock first bound together with wax-end, &c., as the future means of attachment to the pullies, and also, if very full of hair, having it plaited back and secured, prepare to use a short stout scalpel; if double-edged, it is more convenient, and will save trouble in turning. The mode of making the sections must be left to the discretion of the operator, but the junior practitioner will find himself materially assisted by an accurate acquaintance with the anatomy of the tail, which, if not already obtained, he should procure one and inspect, which will assist him much in becoming acquainted with the operation he is going to perform. This will shew him that the tail is neither conical nor perfectly cylindrical, but somewhat

quadrilateral, its upper sides being formed of the fleshy bellies of the
elevators and its [illegible] of the depressors, leaving the under surface of
[illegible] It is of the utmost
[illegible] and that it does not
farther than [illegible] at this part, or he may divide the ligaments and
penetrate [illegible] sacral bone and another, when
and a stiff tail would ensue. This latter accident may, however, be
avoided by making the sections in the centre of a tail-bone, which may
distinguished by the prominences of its articular surfaces, between which
such accident can happen. It is sometimes directed, and practised as
make a section first through the integuments only, beginning at the roots of
hair on one side, carrying it across the bellies of the depressor muscles.
doing the same by the other side, and lastly, by making these sections
by a light [illegible] division of the integuments only, on the median
the tail. Such is a very cautious and proper mode for the tyro, and is
sistent with [illegible] principles of the art; but it somewhat delays time, and
expert practitioner will probably find it more ready to carry his scalpel at
through the depressor by a steady sweep, embracing all the parts to
median line, easing off the depth of section as he approaches it. By
his hand, the same may be done on the other side, by which two
judiciously performed, the operation of an expert hand is at once complete.
first section should not be nearer in the smallest horse than two inches
half, and in a full sized horse three and a half, as the centre of
coccygeal bones may indicate. If another section be wanted, make it at
inches and a half or three inches from the first; and the third, if it be
somewhat less distant than the others; but which latter is seldom now
in any but heavy-tailed horses or determined cock-tails, as the mere hack is
In blood-horses, one or at most two sections, or rather one full and one
section, according to the fulness of the croup and height of the sacral
all that will be at the present day required: for mares of whatever breed.
section less than for a horse is advisable. The most expert operator will
prudent, when the sections are made, to examine them carefully that they
all of equal depth, and have divided the depressor muscles completely.
any difference appear in these respects, and should such unequal
allowed to remain, the operation would be incomplete, and the horse
probably carry his tail awry. Add to which, any portion of the muscle
left undivided, would tend to prevent the others from retracting, and might
serve to promote a reunion of them. Having proceeded thus far, the
rhage which ensues need not be considered as of consequence, nor will it
itself until the tail be wholly relaxed: while it is elevated, therefore,
to remove the tendinous ends, which will bulge out, not being retracted
the divided ends of their accompanying muscles. If one section only be
they will be less prominent than when there are more; but enough will
protrude to enable them to be laid hold of by a tenaculum or forceps, and
cut off by a pair of strong and sharp scissors. The removal of these will
only separate the attachments of the muscles farther from each other,
reunited, would of course frustrate the operation, but their removal
facilitates the healing of the wounds.

The sections being thus complete, proceed to restrain the hæmorrhage,
is done in various ways. Some do it by means of strips of cotton, tow,
&c., which, twisted and inserted into each nick, are separately tied on the
of the tail. My own practice of late was to place a piece of lint on a pledget
tow, and introduce into each section sufficient to fill it up, over which I
linen strips long enough to tie on the back of the tail, which were then
sufficiently tight to restrain the hæmorrhage. Here also it behoves the
tioner to consider the surgical principles of his operations: he purposely
gulates the tail to prevent a dangerous waste of blood, but the very action
an incipient death to the part, and therefore should be most carefully
against that it does not proceed too far. If the bleeding be considerable, a

require the bandages to be made very tight, I usually loosen them a little in two hours, watching the wounds; but when these ligatures are not necessarily so tight, they may be allowed to remain all night, but should be snipped in two at the back of the tail in the morning, which will not disturb the tail: indeed, whatever the degree of stricture or tightness used in the application of the ligatures, as soon as symptoms of strangulation have commenced, less risk will be run by a too early than by a too late division. When the practitioner is on the spot, an examination of the tail may be made in the evening previously to leaving the horse, when, if the re-action appear to be considerable, which will be known by the tail becoming very hot, it will be prudent to divide them at once, and this more particularly if the operation have been performed early in the morning. Much difference of opinion has prevailed on the subject of dressings, and whether any medicament were proper beyond dry lint. If it were possible to promote the adhesive union, then a dry dressing would be the best; but when it is considered that an early and healthy suppuration is, in human surgery at least, thought to be some guard against tetanus, and as it will enable the dressings to be removed with less difficulty, so there can be no objection to any mild digestive being made use of, if it fall in with the view of the operator. Many of the best veterinarians, however, content themselves with simply watching the nicks, that they be kept clean and free from fungus or other unhealthy process, which, if they do not occur, they use no application but the bandages. It is evident that, were a nicked tail left to itself, the depressing muscles would re-unite, and carry it nearly as before, by the approximation thus allowed to their divided portions: a suspension of the tail afterwards is therefore necessary to keep the divided ends of the muscles apart until a cicatrix be formed, and the interstices be filled up by an organized matter, not muscular, nor contractile. Various means have been used for this purpose; formerly the tail was fastened on the back, to the danger and torment of the animal. It is now suspended by means of pullies, the best of which are double. When one is used, one wheel is passed through a line stretched across the end of the stall, rather behind the horse, and through the other wheel, the line to which the weight is appended. A more improved mode is used by means of two of these pullies, one of which is placed directly behind the horse, at some distance from him, through which, after passing through the pulley on the cross line, it is also carried. By these means, whatever be the motions of the horse, the tail is distended at a right line with the body. The weight used for this distention should be such that, for the first day or two, it will hardly keep the tail straight, or more than straight: for two or three more, elevate it to a little above the horizontal line, advancing it every two or three days to the required height, to an angle of 45°, but never allow it to be carried perpendicularly erect. The elevation ought, however, principally to depend on the height to which we wish the tail to be carried in future; the carriage of the tail should therefore be examined every two or three days, bearing in mind that, after it has altogether done with the pullies, it frequently, indeed commonly, drops a little, by the forced muscles resuming their former contractility.

Among farriers and horse-dealers some difference of opinion has existed relative to the propriety of exercising a horse during the use of the pulley, and also as to how long the pulley should be used; but these matters can never puzzle the veterinarian, being easily solved by a knowledge of the general principles of the animal economy, which alone ought to guide him. The pulley is only an extension of the tail, to keep the ends of the muscles from uniting again; but the simple extension does nothing of itself, as is foolishly supposed, towards the making the horse carry it in future. As soon, therefore, as the wounds are closed, or nearly so, then all benefit from the pulley is finished; but till then, of course, the muscular ends may unite, and frustrate the operation. Sometimes incrustation of the wounds will take place in ten days or a fortnight, and sometimes it will take a longer time. With regard also to the propriety of exercising the horse, there ought to be but one opinion. As the hair is, or ought to be, plaited and carefully secured, so no inconvenience can arise, but every benefit may be gained, from letting him from the pullies, and exercising him gently to remove swelling, &c. &c. The hair being put on the stretch by the force used, so a great part of it usually comes off, and this will happen in spite of every precaution; but the longer it is kept in one immediate position, so much the more certain it is for much to fall off. At the end of five or six days, therefore, it may be untied or unplaited, combed out, and then tied afresh, being first greased at its roots; and the same may be repeated every three or four days afterwards, which is the best means I have found of preventing it from falling totally off.

Having thus carried the operation through its ordinary course, it remains to say somewhat of its irregularities. Occasionally inflammation follows the operation, either from suspending too much weight to the pulley, or forcing it backwards; or otherwise from too long continuance of the ligatures, or too great tightness in them. If it be intense, it may be succeeded by mortification, or it may leave the tail with an unhealthy ulceration, producing sinuses: in the former case, the horse shews evident uneasiness the second or third day, the tail swells, is very tender towards the rump, and the heat is excessive. If the dressings be removed, the wounds appear highly inflamed and tumefied; and unless this inflammatory state be arrested by the most active means, the wounds will become gangrenous, the stump will feel cold, and mortification will proceed towards the body, and either destroy the horse, or it is sometimes arrested at the base of the tail, where a separation between the dead and living parts takes place, and the tail drops off. In these cases the treatment must be prompt, and exactly such as is already detailed for active and important inflammations: as a part of such treatment, remove it from the pullies, or only very slightly suspend it; wetting it frequently with cold water; keeping it continually so, will be found even more useful: it is also a good preventive to apply cold water during the common process, whenever the tail is at all hotter than is wished. Another evil to which these cases are exposed is that of tetanus or locked jaw, which is brought on by causes unapparent to us: in some instances, however, heat in the temperature of the air seems to operate on it. It makes its appearance, in many cases, about the fourth or fifth day, and occasionally later; and is often observed to be preceded by an unhealthy aspect of the wounds, and by a cessation of suppuration in them: sometimes, however, the wounds remain unaltered. The first step in these cases is, to dilate the wounds; if that does not succeed, amputate the tail a little above the first section.

AMPUTATION OF THE EARS, OR CROPPING.

Custom has nearly abolished this worse than useless practice: circumstances may, however, occur to render it necessary, such as one ear becoming blemished; therefore, at the makers of surgical instruments we always find a sort of curved clams, called cropping-irons; into these one of the ears is introduced, and the upper part is cut off at one stroke with a knife of sufficient length; the excised portion serving as a guide for forming the other crop. A young practitioner is apt to be alarmed at the retraction of the skin from the cartilages, but the exposed edges disappear in a few days. Horses often continue for a long time very shy about the head by cropping; to lessen which both the bridle and the halter also should be used without a forepart or fronting, till the ears be well. The bridle should likewise be made to unbuckle at one side from the bit, so that the headstall may be dropped on without the hand being raised to pass it over the ears. This will materially operate in dissipating the customary shyness that otherwise so long remains, and which is never wholly lost if force and cruelty be afterwards used.

FIRING.

This becomes an important and a very salutary agent in good hands. The practise of firing was not always confined to quadrupeds; on the contrary, it probably was first used on man; and to this day in many countries it is a very popular remedy among human surgeons. In India it is applied over the abdomen for the cure of scirrhosity of the liver; and among ourselves also its use is rather on the increase, particularly the mediate firing by means of Indian moxa for scrofulous enlarged joints, and some other topical congestions*. In veterinary practice it would not be difficult to prove that we have no remedies that can compensate for its disuse, although it is now somewhat got into disrepute, because, like all other good remedies, it has been abused, by being often unnecessarily and sometimes injuriously applied. It is less sanctioned at the Veterinary College than formerly, as a check to the rage for practising it on every occasion: but it is to be hoped that, in avoiding one evil, we may not fall into a greater, by the disuse of a valuable remedy on proper occasions. Firing is performed on horses for two purposes: one for the forming of a permanent bandage to a part, which it does by destroying the elasticity of the skin and lessening its surface: the other, that of raising an active inflammation, and thereby exciting absorption. Sometimes it is used to answer one of those purposes only; and sometimes it is performed to promote both conjointly. The Arabs fire the joints of their young colts to strengthen them by the constant bandage the cicatrix forms to the part. Some English breeders of blood horses have done the same, but the practice is rare, and in my own opinion not philosophical, and consequently it must be erroneous. Of the blood horse we expect superior locomotive powers: the Arab values his steed by his speed: the imagery of his poetry is derived from the swiftness of his paces; and the English race-horse likewise is estimated in the exact ratio of his fleetness. Firing acts as a bandage to healthy parts, but there are few persons who have to run a race that fetter their *healthy* limbs with bandaging: the skin is by nature made elastic, that it may dilate to the swelled muscle, or to the pressure of the bent joint: whatever, therefore, corrugates the skin, and permanently lessens its dilatability, must fetter and confine the motion of the limbs, and thus impede the velocity of progression. The same will apply also to the adult horse in even a greater degree; and though we do hear of some racers who have lost little of their speed after firing, yet, unless performed so lightly as to effect but little alteration on the part, it must tend somewhat to obstruct motion. Osmer remarks, 'that contracting the fibres of the skin by firing will impede the velocity of motion.' There must, however, arise cases when, all other remedial plans having failed, it would be madness not to have recourse to this even in the racer. Firing is nevertheless more used as a cure of disease, and as a palliative of its effects, than as a direct preventive, and is *principally* applied to fulfil the following *important* indications:—by raising an artificial inflammation to lessen a morbid one already existing, and by offering a powerful stimulus to the absorbents to remove injurious deposits. *Subordinately* it is intended to act as well remedially, and in palliation of the consequences of former disease, as preventively of new inroads of the same. We use cauterization to combat inflammation when we pour hot water on the pasterns to relieve pneumonia; or when we draw a large heated surface over the integuments of the belly in enteritis. But we do not, in general cases, apply the actual cautery to parts themselves in a state of active inflammation, particularly of muscular and other vascular tissues; but in slow unhealthy processes, where the existing inflammation is the consequence of reaction produced by such morbid processes going on, here we fire with great confidence. Such cases are found in bony exostoses, and in the thickened state of the tendons and ligaments still suffering under the effects of former distention or bone. It has, however, been said that we ought never to [illegible] object is only to excite inflammation [illegible] the skin, and when the [illegible] not necessary to fire. The [illegible] is good, but it [illegible] been [illegible] with [illegible], and *pressure* should have been substituted for [illegible] fire the [illegible] over a [illegible] of [illegible], [illegible] inflammation [illegible], without any view to future [illegible]. We [illegible] means to engorge the neighbouring vessels [illegible] secretion of bone, and also to [illegible] the absorbents [illegible] ostosis already deposited. We do hope to gain much after the [illegible] the skin is removed, by the *pressure* of its cicatrices, [illegible] its stimulating effects on the remaining tumour. Some of the [illegible] most durable benefits we derive from firing we thus [illegible] gained [illegible] medium of inflammation, and it is this view that has given rise [illegible] of applying a blister over the cauterized surface, both to increase and [illegible] the inflammation. The result is *absorption*, and this is our grand aim [illegible] we attempt the removal [illegible] of some [illegible] organs. The parts we [illegible] are usually tendinous, ligamentous, and bony, and which, [illegible] larity, are endowed with a less share of the powers of [illegible] so readily fall into disease as muscular and other parts [illegible] but they are equally subjected to decay when their [illegible] less capable of protecting themselves from accidental [illegible] with direct morbid attacks. We are therefore forced [illegible] bring the part into a healthy action. When an effusion of lymph has [illegible] place that glued the cellular and ligamentous connexions of the [illegible] and articular [illegible], probably deranging the very internal structure [illegible] tendon, [illegible] it is evident that parts must be glued, as it were, [illegible] into a [illegible] which should be completely distinct to perform their tions properly.* We [illegible] blister repeatedly, and may gain some [illegible] but we [illegible] is that all: if we fire, we apply a much [illegible] stimulus, and none but a high one will do: often we gain our end at once, we gain more, for, by tightening the skin, we keep up *pressure* as a sti to future absorption, and gain a permanent bandage. Here, then, firing according to the last of my indications on this subject: that is, it acts reme and in palliation of the consequences of former disease, as well as preven of fresh attacks of the same. The immediate cases which call for firing are pointed through the body of the work: and although I have stated that much more efficient in action than a blister, yet it is infinitely more pa and therefore should never be resorted to where the end might be obta otherwise. Blisters promote absorption, and, when the horse can be spar have them repeated, they are very active agents: and, as they leave no ble they deserve, in many instances, to be preferred. It has been very comm blister also immediately after firing, but the practice is on the wane, and manity directs that it should be discontinued whenever not imperatively c for; but I would not recommend the practitioner to be deterred by po outcry to do whatever is necessary for the benefit of his patient. When it consequence to keep up the irritation in future, or even to increase it a present, which we dare not do by deeper firing, or by lines too near each o then blistering *immediately* after firing is admissible. Such cases occur in very great and old indurations of one immediate part, ligamentary or osseous; but when firing is applied to four *stale* extremities, or even to two, which present only the ordinary appearances of disease, it is not only unnecessary, but it is wantonly cruel, and, what perhaps will be more deterring, it is dangerous also, and has proved destructive.

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* The actual cautery has never wholly fallen into disuse in human surgery, from the time of Hippocrates to the present; but it has slumbered among Europeans for the last half century: there is, however, much reason to believe it will be again revived into more general use than heretofore. Larrey and other French surgeons favour its application. Baron Rust, of Berlin, considers it as a most powerful and efficacious remedy. Sir A. Carlisle advocates a sort of mediate firing, by a metallic substance heated in boiling water, and applied on the part, wetted silk being interposed between the metal and skin. Many surgeons use the actual cautery in poisoned wounds, and in the extension of the original lesion in traumatic tetanus: and, without doubt, it would be much more employed, were it not for the fears and prejudices of the public.

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* Mr. Turner, in his paper on deep firing, which appeared in the *Lancet* of September 1830 admirably [illegible] a [illegible] found in the fetlock joint. 'I will suppose a tumo the inner or the outer [illegible] contiguous to either of the sesamoid bones, this a very *frequent* of lameness, the pulley-like joint formed by the sesamoid bones being more or less involved enlargement [illegible] to be met with rather more frequently on the *inside* of the fetlock joint, near to the *cutting place*, but distinguishable from the effects of striking, in an instant, b experienced eye: it is a diffused swelling, consisting of a condensation of cellular tissue and l effused under the skin, where the integuments preserve their original or natural thinness; but th usually an accompaniment which completely stamps the character of the enlargement, viz. a projection or thickening of the inner or outer branch of the *suspensory ligament*, as may happ be the affected side, just below the bifurcation; the other parts of the leg may be sound and and the patient tolerably free from lameness whilst at rest, but when put to ordinary work, lam ensues immediately. I need scarcely add, that this consolidation of parts originates, in nine case of ten, in a sprain of the elastic suspensory ligament. Sometimes *both* sides of the joint are sim affected.'

The *mode of cauterization* differs according to circumstances. As a general rule it ought, of course, to be applied in the direction of the hair, by which the blemish is lessened; but this rule cannot be arbitrarily followed, although it ought to do away with all the false pride of exhibiting critical figures by the cicatrices. The Veterinary College recommends that the limbs be *always* fired in perpendicular lines, the reasons for which are obvious. If it be applied as a bandage, in no direction can it corrugate the skin in so effective a manner as one inversely to the action as well as enlargements of the parts. When the principles of the action of the cautery are understood, all attention to particular forms or figures in the cicatrices which are left, beyond what are suggested by the *medical* consequences to be expected from it, are fanciful or empirical. Some cast the horse; many others perform it standing: there is a sort of '*esprit du corps*' among veterinarians, to perform the most desperate operations without casting; and certainly there is this excuse, that once in nearly a hundred cases a fractured vertebra may occur; but there are such things as fractured limbs, ribs, and skulls, happening to the attendants also without it: however, every one to their fancy; mine has always been to cast the horse to fire, having first cut or shaved the hair as closely as possible. The junior practitioner may chalk the lines he means to make, or the cloud of smoke may obscure the vision: the experienced artist would disdain this. The irons used are of various shapes and dimensions; as the searing-iron for docking, the budding-iron for cavities, and the lunettes in great variety for linear firing, with many others. All firing-irons should be sufficiently thick to retain the heat, and should never be heated to a white, but to a red heat only: and in firing in lines, care should be taken that, by repeated heating, the instrument does not gain too sharp an edge, or the skin may be fired through, which, although it is by Mr. Turner now advocated, and very properly so in some desperate cases, is not even yet a general practice. When therefore it is not intended to operate by *deep firing*, as it is called, be mindful after each heating to rub the edge of the firing-iron moderately, thereby to round it, and also to remove any loose scoriæ that may be attached. The best mode of heating the irons, of which there should always be three or four, is by means of a charcoal fire in a chaffing-dish, placed not far from the operator, which will save much trouble, and greatly expedite the business. In spite of the account of deep firing presented to us by Mr. Turner as a safe and more effective plan[*], I cannot but caution the junior practitioner to

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[*] This method of Mr. Turner's he introduces to our notice by a slight sketch of what he calls superficial firing, as practised at the Veterinary College, and as recommended by Mr. Percivall and by myself, which he contrasts with his own thus: 'Viewing the other method, my practice in firing of horses has convinced me, that the *success* of the operation, *if performed for the removal of lameness*, where the ordinary means have failed, whether situate in a joint or a sinew, depends solely on making each separate line or incision, from end to end, completely *through the skin* or common integuments, *cutis* as well as cuticle, and boldly exposing the cellular tissue, forming the immediate covering of ligaments, tendons, periosteum, &c.; with all due caution, of course, not to pass the instrument so near as to wound or sear these important structures. When the part operated on happens to be the inside of the hock, a case of spavin, for instance, all the dexterity, tact, talent, and *nerve* of the experienced practitioner will be in requisition; for while he strenuously exerts himself amid the struggles of his patient, he revolves in his mind the absolute necessity of his instrument reaching the surface of the disease itself; and yet, on the other hand, he has to consider the paramount necessity of avoiding a puncture of the capsule of the joint. With respect to additional cruelty attending this mode of firing, I admit that it is a natural inference to draw; but I doubt the fact, for this reason—less tumefaction follows my method than attends the other next best plan of firing, which consists in passing the instrument *all through the skin* at the time of the operation, so that the remaining portion ulcerates through in the course of the suppurative process, by about the third or fourth day. Now, when we reflect that there is no organ more abundantly supplied with nerves than the skin of a horse, it must be obvious that we diminish, instead of increase, the sufferings of our patient by the *perfect*, rather than the partial lesion of such organization.' Mr. Turner in addition observes, 'that both himself and brother have practised these deep incisions by cautery successfully for a series of years, and that nevertheless they defy the world to say that a single mishap has occurred from the severity of the operation.' From talented and most respectable practitioners, as

[illegible] Mr Turner [illegible]

[illegible] the firing [illegible] applied unless the weather be very [illegible] which case a small quantity of tar may be rubbed on, and some [illegible] wrapped over, which will keep the flies from attacking the part; after [illegible] days, gently rub over some oil or other greasy matter daily, to prevent [illegible] ing of the skin. It may be well to observe, that the benefit derived from [illegible] is not always immediate; on the contrary, it often does not shew itself [illegible] weeks after; the reason of which is, that the continued pressure caused [illegible] the [illegible] being a constant stimulant to the part underneath, the re[illegible] absorption is at length effected. It shows the versatility of the [illegible] new theories and new practices, or rather of bringing up old [illegible] ones, to observe, that while Mr Turner is endeavouring to promulgate [illegible] *firing*, M. [illegible], Assistant Professor at Alfort, is attempting to revive [illegible] custom of *moderate or mediate* firing, recommended by Solleysel*.

[illegible]

* [illegible] high temperature of boiling oil over that of water. This *moderate* firing admits of many modific[illegible] in human surgery, and, by the accounts rendered by M. [illegible], is very effective in veterinary p[illegible] also.

BLISTERING.

This is an operation of very great utility, and is, perhaps, compared with its benefits and importance, the safest that is performed. When a *vesicatory* becomes absorbed through the pores of the skin, it inflames the sensible cutis underneath; the consequence of which is a determination of serum to the part, which, in the human, elevates the cuticle into a bladder equal to the surface inflamed: but in the horse, from the greater tenacity of the cuticular connexions, it becomes separated in the form of small distinct vesicles only. If the irritating cause be quickly removed, the serum may be reabsorbed, and the surface restored by a slight effort of adhesive inflammation. If the irritant act in a still minor degree, it simply irritates the vessels of the cutis to an infiltration of fluid through the sensible pores, but produces no desquamation of cuticle: such has been called, and not so erroneously as supposed, a *sweating blister*. But when by continued irritation, or by denuding the surface by rupturing the vessels, the cutis is exposed, suppuration succeeds, and the part is fully blistered. The salutary action of blisters is exerted in several ways, in promoting absorption, in combating deep-seated inflammations, and in aiding others. As a stimulus to the absorbents, they act beneficially in the removal of injurious deposits, as the coagula remaining after inflammatory lesions consequent on strains or ligamentary extensions; and we expect them to act beneficially also in the same way when we apply them to the exostoses of splints and spavins. But it is to be remarked, that when any existing deposit is of long continuance, or is osseous, it requires that the action of the vesicatory be kept up, either by repeated active blistering, or by a frequent renewal of a milder kind of the original blister, or by a daily application of the ointment of savine. (See *Mat. Med.*) Mercurial blisters have been thought to have a superior influence in accelerating absorption. I was once of the same opinion; but I now believe it to be very doubtful, whether any mercurial preparation mixed with other vesicating articles acts in any other way than as it vesicates or produces an eschar: and that mercurials, *rubbed in* some weeks or days previously to blistering, are great assistants, and should always be employed in the treatment of obstinate osseous or ligamentary enlargements. Blisters are very important aids, in inflammatory affections, as counter-irritants, derived from a law in the animal economy, that two inflammations seldom exist in the vicinity of each other; therefore, when such an affection has taken place in any part, and we wish to remove it, we attempt to raise an artificial inflammation in the neighbourhood by means of blisters; which, if we effect, we remove, or at least lessen, the original one. Thus, in inflammatory affections of the lungs, bowels, &c., it is proper to blister the chest, belly, &c., very extensively, by which means the vascular action may be removed from the vital organs to parts of less importance. Occasionally also we blister the immediate inflamed part, as in phlegmon or abscess, with a view to hasten the suppurative process by increasing the activity of the vessels, which in some cases are somewhat tardy, as in deep-seated abscesses, and also in those which attack glandular parts. We, therefore, employ blisters to hasten the maturation of the tumours in strangles. In these lingering phlegmonous inflammations, blisters are peculiarly indicated, by their capability of acting either in retarding or promoting the inflammation existing in a part, as the case may be. When the flagging powers vacillate between resolution and suppuration, as they often do in the phlegmonous inflammations of glandular or of deep-seated parts, blisters may either act as derivatives, and hasten the resolution, if the tendency so inclines, or they may add their influence to the attempted suppuration, and thus shorten the process in that way; for when it is long delayed it is always to be dreaded in either of the situations specified. But we carefully avoid, in other cases, applying a vesicant to a part immediately in a state of active inflammation: particularly we should avoid what is too often done, that of blistering over the tendons, ligaments, and articulatory surfaces of a tumid limb, labouring under a congested state of the parts from

[illegible]
[illegible]
[illegible]
[illegible] parts whose functions require [illegible]
[illegible] for general use [illegible]
[illegible] principally composed of Spanish
[illegible] *M*[illegible] *M*[illegible]
[illegible] affections, they are [illegible]
[illegible] case requires [illegible]
[illegible] sufficiently known. The hair
[illegible] from around the part; the ointment
[illegible] for ten or fifteen minutes, on which
[illegible] its operation depends; having done this
[illegible] on the surface with a spatula. If the
[illegible] parts to be blistered, previous to rubbing in the
[illegible] lard, over the heels, and within
[illegible] pastern. This will often prevent grease or
[illegible] the blistering ointment falling [illegible]
[illegible] necessary to be observed with regard to the
[illegible] of continuous parts, particularly [illegible]
[illegible] the suppurative surface is very [illegible]
[illegible] state of grease, and to produce much [illegible]
[illegible] blistering cannot be avoided, much caution is
[illegible] to prepare the animal for it. While a
[illegible] removed from under the feet, or it will
[illegible] horse should also have hay or other food
[illegible] his attention and quiet the pain; but
his [illegible] secured, for two days and nights, to
[illegible] to prevent him biting the blistered
unless this be particularly attended to, the irritation will make him
dangerous [illegible] On the third evening he may be permitte
down, but a preventive should even then be continued, by means of
called a cradle, which should also be put on the moment the blister
[illegible] an assistant security. This apparatus may be boug
at [illegible] it may be made of eight or ten pieces of round
inch and a half in diameter, and two feet long; these are strung at
on [illegible] around the neck, by which the horse is effectu
vented from bending his neck to bite or tear himself. When it is in
blister repeatedly, the effects of the first should have completely subsid
the blister is renewed; the scurf and scabs also be cleared away, and
well washed with soap and water, which will free it from any matter th
obstruct the action of the renewed blister. In all cases, the third or fo
after the application the part should be well rubbed with some la
oil, or other greasy matter, to prevent the skin cracking and chappi
when it is proposed to turn a horse out afterwards, it should never
until the whole blistered surface be quite healed, otherwise dirt, flies,
prove hurtful. I would also add to what has been already said on this
that in blistering for exostoses, as ringbones, splints, spavins, and also
mentary indurations of long standing, by farriers called 'callusses,'
recommended to rub the part well with mercurial ointment once or twic
for a week or ten days before the blister is applied; by which means the
and action of the blister appear to be increased. It remains to obser
instead of repeated active blistering, it is in some cases preferable to
a continual slight irritation on the original blister by means of stimul
turpentine, savine ointment, mild blistering ointment, &c.: caution is
necessary to avoid forming an eschar, and thereby a permanent blemi
when a blemish is not of consequence, this plan will be found often more
cious than firing, as in splints, spavins, &c. Some practitioners blister
one day, and on the next wash off the blistering matter, and thereby s

loss of hair. But there is more of appearance than of reality in this plan. If a blister be necessary, it requires all its activity; if it can be dispensed with, and yet some stimulant be wanting, use the following, which will equally save the hair, and promote a longer action.

Sweating Blisters.—This term is made use of among farriers to imply a moderately active stimulant, generally of a liquid kind, that, while it will rouse the absorbents, yet will not excoriate, raise the cuticle, or cause a separation of hair; but will stimulate the vessels to a serous discharge, and occasion, as is supposed, a transpiration of fluid matter, or a *sweating* effect, whereby accumulations are removed in the latter stages of muscular and ligamentary strains, as those of the shoulder, hip, stifle, and some others; in which it will be seen I have sometimes recommended this plan. The mode I generally adopt to effect it is this: I apply the liquid stimulant (see *Sweating Blisters* in *Mat. Med.*) of a strength adapted to the irritability of the skin, which varies much in different habits; rubbing in daily a sufficient quantity, so that on the third or fourth day, but not before, a considerable tumefaction or swelling shall appear. I then desist, and suffer the swelling to subside, when I frequently find that it takes with it all the enlargement previously existing, as well as the lameness; if not, I repeat it.

ROWELLING.

ROWELS act like blisters, by inflaming the surface, whereby more deep-seated inflammations are removed: but it is evident they cannot act either so quickly or so extensively; consequently we see the error of allowing them to supply the place of blisters in extensive visceral affections: they are, however, often more convenient and more permanent in their action. The common mode of making a rowel is sufficiently known. A slit being made by means of the rowel scissors on any part of the integuments held between the finger and thumb, with the handle of the scissors separate from its cellular connexions a circle of two or three inches in diameter, into which is introduced something to prevent the reunion of the skin. A piece of circular leather, tolerably stiff, with a central hole, is a very common substance used, but is objected to by some, on account of the difficulty of changing it without injuring the skin, but which, however, I have never seen: tow, as more pliant, is frequently introduced into this cavity; but either should be first smeared over with some digestive ointment: at the first insertion it is often dipped in blistering ointment. If it runs freely, it should be dressed every day, by changing the plug, if of tow, and by cleansing it, if of leather: no rowel should go undressed beyond the second day, for the comfort of the horse. They are very favourite applications with farriers, and therefore are frequently abused, by being employed in all cases indiscriminately; whereas it is evident they are principally applicable to those of plethora, or of inflammations attended with increased action. They are also useful whenever any morbid drain is to be stopped, as in grease and in thrushes; also, when they exist in the whole of the four feet, &c.

SETONS

IN their action resemble rowels, but are more convenient in their application, yet, when single, do not establish so good a drain as a rowel. There is hardly a part of the body where a seton may not be conveniently placed: they have been put around the eye, and even within the lids. They have also been entered at the withers, and brought out at the point of the shoulder, or under the arm, &c.; so capacious and so diminutive can they be made. In sinuous ulcers, not only of the withers, but also of the neck in poll-evil; in all abscesses, and in diseases of the navicular bone, their wide-spread use is acknowledged. In cavernous sores they are entered at the superior part, and are brought out at an inferior or by a depending orifice; thus the pus formed drains off, and with it the diseased secretions. The formation of a seton is very simple: a

[illegible]

[illegible]

[illegible] the general [illegible] throughout the whole as necessa for the [illegible] of the part and as our only means frequently of local ap of the principal [illegible] of depletion. Any instructions on the different met blood-letting will be rendered most useful when accompanied by an ana sketch of the situation and connexion of the vessels from whence blood is [illegible] than the practitioner travels unguided, and is often misle is directed to puncture the jugular, but it is of much importance that he know *whereabout* he is to do it: in one part he may at once puncture th the artery, and the windpipe, and drown the animal in his own blood: in part he may cut through so thick a coating of muscular matter as to make [illegible] inflammation almost inevitable: or he may divide either a recurre par vagum nerve. Arteriotomy is not very frequently practised on the there are occasions, however, when it may be usefully employed.

Division of the temporal artery was thought to be essential to depleti globe of the eye, but which I have elsewhere shewn it can but have little in doing: it may, however, be prudent to open it in phrenitis or stagger sometimes in angina it may afford much relief. The proper spot for its puncture or division is in the track of its course where it leaves the p and curves upwards and forwards around the jaw, a little below its co (See *plate* 4, *and description*, p. 196.) When it is *punctured* it affords blood usually, and in such case, when enough has been obtained, *divide* t maining trunk; when the receding portions becoming pressed by the integuments and by their own muscularity besides, stop the hæmorrhage. It should be punctured by a lancet; a fleam may wound the periosteum, and even fix itself in the bone: its division can be readily made also either by a lancet or scalpel.—*Division of the vessels of the conjunctive coats*, either of the globe or the lids, includes both arteriotomy and phlebotomy, and is readily operated by fine sections with a sharp lancet.

Bleeding by the palate is also a species of arterio-phlebotomy, and is a very favourite spot for abstracting blood with farriers in many cases, but particularly in spasmodic colic or gripes, and in meagrims or epilepsy; in the latter of which it may with propriety be done. In such cases, however, a want of knowledge of the anatomy of the parts has occasioned a serious hæmorrhage to occur: it may prove a fatal one if the vessel of the part be divided incompletely. The palatine vessels and nerve run near each other, on each side of the roof of the mouth, passing up so as to divide the surface of the palate into three nearly equal portions. No other than a direct division of the bloodvessel should be made; therefore, when bleeding is determined on here for the purpose of abstracting a full flow of bood from the head, as in staggers, epilepsy, &c., it is to be done by plunging a lancet or even a pen-knife in a *direct* line *across* the rugæ, *one inch within the mouth, exactly between the middle and second nippers*, where these vessels form a curve, and which curve will then be divided, and will yield three or four pints of blood. If the instrument enter too much on one side, as about the middle of the second nipper, then a *partial* and *longitudinal* division of the artery may be made, and an alarming hæmorrhage may follow. In this case the section must be enlarged and deepened outwards, that is, towards the teeth, which will *completely sever* the vessel, and its retraction will stop the hæmorrhage. A moderate or slight flow of blood from the palate may be obtained by light scarifications of the rugæ: but all bleedings here, except under circumstances of the most urgent necessity, had better be avoided*.

Bleeding by the toe is also arterio-phlebotomy, as it divides the circulus arteriosus and the venous meshwork at the same time. By no means cut out a portion of the sole at the point of the frog, which frequently occasions abscess and even canker; but with a very fine drawing-knife cut down exactly in the line of union between the crust of the sole and of the walls, and then, by puncturing the part with a lancet, a vast flow of blood may be obtained, the benefits of which in some cases are very marked, particularly in acute founder. If the blood should not flow with sufficient freedom, place the foot in warm water: the bleeding finished, cover the puncture, and lightly tack on the shoe. Sometimes the *plantar vein* is opened as a substitute, and now and then the frog is punctured through its cleft for the same; but they are neither of them equally convenient, safe, nor efficacious, as spots for bleeding.—*Scarifications* are also occasionally practised, which, of course, divide both venous and arterial rami: they were formerly employed under an idea of arresting the progress of mortification; but sections made into the living parts can only reduce such parts into the same state with the dead, and thus we should propagate the destruction. In France extensive scarifications were used to be made into phlegmonous indurations before the suppurative process had commenced, which in some cases prevented that from going on; and the *remedial wounds* made were healed by adhesive inflammation, or by healthy granulations: the same method has also been occasionally practised here, but it is not now often attempted.

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* The ingenious writer of the article Horse, in *The Library of Useful Knowledge*, has inserted a very accurate and useful *sketch* of the course of the palatine arteries; and Hurtrel d'Arboval, with his accustomed detail, has furnished us with the directions of Chabert for the performance of palate bleeding, as follows: 'Selon Chabert, la pointe d'un bistouri courbe bien affilée, tel que celui dit à serpette, ou la lancette cachée, sont des instrumens très faciles à introduire dans la bouche, à l'endroit des barres. La lancette cachée et à ressort n'étant pas usitée, nous n'en dirons rien de plus. Voici comment Chabert s'exprime sur la manière de procéder à la seignée du palais, en se servant du bistouri courbe. Tirez la lame du bistouri de son manche, faites-lui par courir un quart de cercle; saisissez-la avec le pouce et l'index de la main droite, et à trois lignes (sept millimètres) de sa pointe, le troisiéme et le quatrième doigt reposant sur le reste de la lame, le petit doigt placé du côté du pouce, et portant sur la tête du clou sur lequel la lame se meut; le restant du manche hors de la main, et dans la direction de l'annulaire et du petit doigt. Ordonnez à l'aide chargé de tenir le malade de saisir les branches du bridon avec sa main gauche, tandis que sa main droite sera occupée à tenir hors de la bouche l'extrémité de la langue de l'animal. Saisissez de la main non occupée de l'instrument le bout du nez de l'animal; soulevez-le avec assez de force pour lui ouvrir la bouche; passez ensuite dans cette partie la main armée de l'instrument; dirigez-en la pointe dans le milieu du cinquième sillon, à compter des pinces; enfoncez d'environ deux lignes (quatre à cinq millimètres); prolongez, par un second temps, l'incision jusqu'au troisième sillon. La rugosité étant incisée transversalement dans sa partie moyenne, retirez votre instrument, abandonnez le nez du malade; que l'aide lâche la langue, le sang sortira, et l'operation sera faite. Après avoir coulé en assez grande quantité, il (le sang) s'arrête ordinairement de lui-même. S'il ne s'arrêtait pas ainsi, ayez recours à une éponge imbibée de quelque liqueur astringente, que vous aurez soin de faire tenir sur la plaie; et, dans le cas où ce moyen ne suffirait pas encore, chargez un plumasseau d'agaric en poudre, que vous ferez tenir sur cette même partie, jusqu'à ce que le sang soit entièrement étanché J'ai vu une hémorrhagie assez rebelle pour ne céder qu'a une compression forte, longue et constante.' *Voyez* l'art. Lampas, ou nous sommes entrés dans quelques autres details relatifs tant à cette saignée qu'à ses suites.

Phlebotomy, or the division of a venous branch, is the most usual mode of drawing blood in veterinary practice, and may be employed on any point of the body; but some vessels are much more frequently opened than others, and most of all the jugular, with which I shall finish.—*Bleeding by the thigh vein.* The *saphena* is a prominent vein, continued from the inner and fore part of the hock, ascending obliquely up the middle part of the inside of the thigh, and may be opened by the fleam, but with much greater safety and propriety by a lancet. The opposite leg being held up, the operator placing himself in front of the thigh, and steadying himself and the horse by placing one hand on the hock, may fix the vein with the little and ring-finger of the other, while the lancet held between the thumb and fore finger punctures it.—*Bleeding in the plate or plat-vein.* The *superficial brachial* vein is frequently made use of by farriers to abstract blood from injuries real and supposed to the fore extremities. When I say *supposed*, I allude to the thousands and tens of thousands of bleedings here for lameness considered to have its seat in the *shoulder*, when it has been, probably, in the pastern or foot. The superficial brachial or cephalic vein is a continuation of the superficial division of the metacarpal veins, and in the passage upwards furnishes more than one *superficial* branch, which may be opened to relieve any injury to the radial or fore-arm vicinage; but its principal trunk ascends along the inner side of the radius, inclining gradually forward to the front of the biceps to the shoulder point. This may be very conveniently punctured by means of the lancet: the unsteady hand would find an excellent aid in Mr. Weiss's spring lancet. It may also be well to remark, that, when taking blood from the superficial veins of the arm or fore-arm, and any difficulty is experienced in obtaining a sufficient flow of it, the lifting up of the other leg, by throwing the muscles of the punctured one into action, will so force the blood from the inner to the outer set, that an increased quantity may be obtained. The spur vein, or external thoracic, is also sometimes opened, as it emerges from behind the arm. The *inguinal branch*, also called in cows the *milk-vein*, and among farriers the *belly-vein*, I have likewise known to be bled from by farriers: but in these local bleedings it is very often that the disease for which they are opened is altogether mistaken; and when it is not, it is seldom but that a general bleeding by the neck and a proper application to the part would have done much better.

Bleeding by the Jugular or Neck Vein.

The situation of this important vessel is well known, but its internal connexions are not so familiar, though such knowledge is essential to the *uniform safety* of the operation. The horse has only an external jugular vein, a right and a left: as each emerges from the chest, it is found deep-seated, and approaching the trachea; it then passes forwards in company with the external carotid artery: towards the middle of the neck it becomes more superficial, and is now distinctly seen progressing rather *above* and *without* the carotid artery and trachea, or windpipe. The carotid, therefore, in the future course of the jugular track, is situated a little *below* and *within* the vein, having on its outer side the par vagum nerve; while the recurrent nerve courses between it and the trachea. The jugular is also slightly separated from the carotid, the trachea, and these nerves, by a slight muscular expansion given from the levator humeri. Its further track is marked in the hollow formed by the inferior edge of the levator humeri and the upper one of the mylo-hyoideus, where it is covered by the panniculus carnosus and integuments only; when, having reached the prominent point of the parotid gland, within a few inches of the jaw, it makes its well-known *division* or *bifurcation* into two portions; the upper being continued under its former name, the lower as the *submaxillary vein*. Bleeding by the jugular is usually practised with a lancet, or with a fleam. The *lancet* has the most surgical appearance, but it requires much more skill and dexterity to become master of it, it being more difficult to bleed a horse than a man by this means. The spring lancet, invented by Weiss, however, is said to obviate much of the difficulty which young practitioners experience, who are usually forced to open the vein at two efforts with the lancet, one through the integuments, and the second through the coats of the vein. A little perseverance, however, with a good lancet of a proper size and shape[*], will render the practice both familiar and easy. The proper spot for the puncture may be found any where between two inches and six from the bifurcation of the vein, or within a foot from the head: this latitude is here mentioned, because it is prudent to avoid puncturing directly over a former bleeding place, known by the scar and enlargement: it should also be avoided where a little knot in the course of the vein will sometimes detect one of the venous valves, inflammation having followed from this cause. But in all ordinary cases, where these hinderances do not appear, operate at two or three inches from the division of the vein, which will be sufficiently evident when it is pressed on. Avoid operating low down in the neck, as there the vessel is deeper seated, has more covering, and approximates the carotid artery, the trachea, and important nerves, too closely to render it safe from danger in any resistance of the horse or slip of the instrument. First moisten the hair and smooth it down; then, steadying and enlarging the vessel with one hand, with the other plunge the point into the integuments, so as just to puncture them and the vein; then, by a slight turn of the wrist, carry the instrument obliquely forward to finish the cut: for opening the smaller veins, the *lancet* should always be used. In all but the well-practised hand, the *fleam* is the safest instrument[†], the breadth of its shoulder being favourable to a quick and full flow without danger of puncturing the contrary side of the vessel: when using it, it is always prudent to have the eye of the horse covered, which I prefer to having the head turned away, as apt to give the vein a curve that is favourable to the puncture of its opposite parietes: unless the eye be covered, the horse will be likely to flinch at the moment of the stroke, and the puncture may be made in any place but where we wish. The hair being first smoothed and wetted (some cut it close, but which is objectionable on the score of its unsightliness), and the fleam being retained in the left hand, the unemployed fingers pressing on the vein so as to fix as well as swell the vessel, let the star rest *directly*, *centrally*, and *longitudinally* on the vein; strike it with sufficient force to penetrate the skin and vessel, but avoid so much force as will carry the star point through its opposite side. A blood-stick is preferable to the hand for the purpose of striking the fleam: there is a vibration between the collision of two hard bodies when they meet, which, in this instance, is more favourable to a quick and moderate puncture of the vein than a more violent stroke of the hand would produce: the re-action from a smart but not violent stroke made by the blood-stick occurs before it has reached the opposite side of the venous tube, which further prevents danger. A ligature is very seldom necessary in bleeding, and, by distending the vessels to turgidity, makes the vein more difficult to steady. Horses thus strangulated have fallen also; neither is it required after, the fingers, or moderate pressure from the edge of the vessel appointed to receive the blood*, being sufficient to keep up the flow: it may also be encouraged by forcing the horse to champ on the bit, if he be bridled; or, if not, by putting a finger within the bars: in cases that do not forbid it, a little exercise will also distend the veins sufficiently, if they are not evident. The requisite quantity of blood being drawn, remove the blood-can *gently* away from the orifice, to prevent air rushing suddenly into the vein, a caution I shall shew to be necessary. The remaining process of securing the vessel is of equal importance with its section; and is sometimes productive of such very grave consequences, when injudiciously done, as to make some avoid it altogether, contenting themselves with tying the head up to the rack, &c., after having previously brought the lips of the wound into contact, and then glueing them together by passing the finger over the wound, until the blood around begins to harden, and which method may be practised with sufficient safety in some cases, but cannot be so done in others. In general cases, therefore, the severed sides of the cut are first to be brought in exact opposition, without any pinching of them, and without any drawing of them out from the vein, which encourages blood to escape into the integuments, and the formation of abscess: the same cautions should also be observed when the pin is introduced: let it be small and sharp, and round it wrap a few hairs, or a little tow; but observe that it be lightly wrapped. otherwise it may strangulate the part and produce festering, instead of healing at once by the adhesive process; and this is still more likely to happen when too large a portion of integument has been included within the pin-hold.

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[*] I always myself bled with a lancet of the abscess kind, with its shoulders moderately broad, one of which was slightly concave, the other slightly convex: on using this lancet, the convex shoulder was the upper; and, consequently, this inclined the point somewhat downward, for the more ready penetration of the integuments, and the same shoulder effected the after-enlargement of the wound with much facility.

[†] The operator will do well to furnish himself with a fleam having two or three substantial blades; not thin, to endanger its indentation into the coats of the vein, but of sufficient substance to resist all passage of the star or lancet part beyond its limits. It is essentially necessary to have several sizes of star or lancet part, and some variety of shape also: we should not use the same size for a pony and a cart-horse of seventeen hands high: neither should we wish to make so immense an orifice on some occasions as we should on some others, as in acute inflammations for instance: consequently, some variation in the shoulder of the different stars is required.

The *importance of abstracting blood* in veterinary practice is incalculable. From the extreme quickness with which most diseases of increased vascular action run their course in the horse, it is in many cases our principal resource: and as the nauseating remedies are uncertain in their action, and often slow in producing their effect, it may be considered as our sheet-anchor. It is, however, to be observed, that the quantity of blood taken away is, in general, too small: for a large horse, under any important inflammatory affection, particularly if it be early in the complaint, the first bleeding should not be less than five, six, or seven quarts. In staggers and inflamed lungs, a still larger quantity may be drawn at the first operation. In all other cases not specified, or where nothing particular prevents, three or four quarts may be taken, according to the age, size, and strength of the animal, &c. In all acute inflammations it is of great consequence to draw the blood from a large orifice, and as quickly as may be: the increased action of the vascular system appears to be more readily checked by a sudden evacuation of blood; probably from a sympathetic effect, by which the vessels recover their tone by a hasty depletion. Certain it is, that in the horse, as in man, a moderate quantity only, *taken rapidly away*, will often operate more favourably in giving an effective check to an acute inflammation, than a much larger quantity will do taken slowly, or taken at twice. Blood-letting is also important as a criterion of the *state* of disease; certain appearances of the abstracted fluid presenting certain indications of extreme importance to our treatment. See *Nature and Properties of the Blood*, p. 204. See also *The Pulse*, p. 129.

Common, however, as this operation is, and qualified as every one thinks himself to perform it, yet there are very serious accidents which do occasionally attend: these I will just glance at, as both cautionary and remedial. The most frequent is that phlegmonous inflammation of the integuments, and sometimes of the vein itself, described under *Morbid Consequences of Bloodletting*, p. 424. It has also happened, either by an injudicious bleeding too near to the chest, or otherwise by some accident which has diverted the stroke of the instrument to one side, that the carotid artery has become penetrated. When the puncture has been made through the vein, the accident is known immediately by the forcible and pulsatory gush of both florid arterial blood and dark venous blood. In one instance of this kind, which occurred to a French practitioner, he immediately thrust his finger into the opening through the vein, and thus plugged up the artery, intending to wait for assistance. In this state he remained, I believe, an hour or more; when, removing his finger, to his surprise, he found the hæmorrhage had ceased, and did not again return. But such a fortunate issue is little to be expected in a similar case; the artery may, however, be very properly plugged in the best manner possible, until the horse can be cast, when the practitioner must cut carefully down on it, and encircle it with a ligature: the course of its passage and its attachments may be seen by what has preceded. The intromission of air is also another very serious accident that now and then attends bleeding: it sometimes happens from the sudden removal of the fingers or blood-can, or whatever was used to distend the vessel by obstructing the return of the blood: this being suddenly taken away, allows the escape of the blood towards the heart, and occasions a momentary vacuum, the air being heard to rush with a gurgling noise into the vein by the unclosed lips, where it mixes with the blood, and occasions a train of dire symptoms. The animal begins to tremble; he then staggers, and finally falls in a state of asphyxia: if the quantity of air taken in has been considerable, death ensues in a little time. The remedy must, therefore, be instantaneous, and consists in again opening the orifice, or, by making a new one, to gain an immediate renewed flow of blood, which will, in most cases, renovate the horse, who has been found afterwards tormented with an intolerable itching, probably of a similar kind with that most distressing tingling which persons resuscitated from drowning experience; and from the same cause, also, the passing from death to life.

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* In drawing blood it should be an invariable rule never to let it fall on the ground: it should not only be received into a vessel, but into one by which the quantity can be accurately judged; for which purpose, in every well-regulated stable there should be a tin measure that will hold six, seven, or eight quarts, graduated into pints and quarts, into which the blood should always be drawn.

OF PURGATIVES, AND PHYSICKING OF HORSES.

A FARRIER of the old school would smile with no small degree of contempt and self-complacency if he should glance his eye over the extent of the following detail. As to the all-sufficient groom, who 'can carry a horse through his three doses of physic with any man in the world,' he would wonder what the d—l I could find in it to talk so long about; and yet, if I blotted twice the number of pages, I should leave still much unsaid; so very interesting, so very important a subject is that of the *purging of horses*, to the animal himself, to the owner, and to his medical attendant. I remember when veterinary medicine first began to engage attention, by the establishment of a public seminary for its promotion, that no subject connected with it excited more discordance of opinion than this popular one. Reasoning from analogy only, it was asked by the new inquirers, If a horse be already in health, can purgatives make him more so? or when in health, can they secure him against disease? Neither could those who were educated in the human medical schools (as most of the early students and promoters of the art were) readily understand why, when we wished to promote extraordinary vigour, present strength, and continued endurance of fatigue, with a more free and effective respiration, we should commence by the weakening efforts of repeated purges. Would it not, they inquired, be more accordant with theory and human practice, to expect all this from the stimuli of condensed nutriment and increased exercise rather? Imposing as these analogical queries and arguments appeared at that time, they made but a short and feeble stand against the force of facts and the experience of ages; and the subject has now settled itself into an universal conviction, that the effects of purgatives on the human and on the horse are not altogether analogous, particularly as a promoter of that state of health which is termed condition. Certain peculiarities of constitution generally, and certain states of the alimentary canal particularly, render this process very salutary to the horse: they are indeed essentially necessary to keep him up to that artificial standard which luxury and [illegible] taught us to expect in him. This subject is, therefore, a very important one to the veterinarian, and one that he should well understand, both [illegible] scientifically and popularly, or he may be convicted of ignorance by the common groom, not one of whom but supposes he knows every thing connected with the process, scientifically. He ought to be most intimately acquainted with it, because it is not the same simple, easy, and safe operation as it is in man, [illegible] almost any management, but, on the contrary, it is a much more complicated, difficult, and dangerous one; and although properly prepared, properly administered, and with proper treatment, it is not more useful than safe, yet is it daily practised by grooms, stablemen, and the dabblers in farriery, whose skill is usually equalled only by their presumption. Scores of horses are [illegible] by it.

[illegible] and effects of purgation.—The principles of purgation are the same in man and the horse, but the products vary: thus it commonly requires twenty-four hours to produce complete catharsis in the horse, whereas two or three hours, and often less, will effect it in man. Specialty of structure produces the difference. The alimentary track is of immense length in the horse, and the surface to be stimulated into action is consequently of great extent: add to which, that the erect position of man is favourable to a gravitation of the excrementitious contents, particularly of the liquid contents, but which the horizontal posture of the horse tends to retain. Cathartics act by stimulating the intestines to a more frequent evacuation of their contents, and they also increase the quantity of the matter expelled: under some circumstances they alter the quality of it also. A simple increase of the peristaltic motion of the bowels hastens the expulsion of the excrementitious parts of the aliments. A larger stimulus will not only so hasten them, that the fluid contents of the bowels cease to be absorbed, but the secreting surface of the intestines themselves will furnish fluid matter also. If stimulated still more, the biliary and pancreatic fluids are poured forth in greater quantities, and the alvine secretions are altered thereby. This being the simple operation of purging, it is evident how many erroneous notions are entertained relative to it; and more immediately that which has been termed *elective purgation*, or the giving of particular substances to purge particular humours, is wholly vague. Purging is used to reduce swelled legs, but no purge acts on the legs *immediately*: for it cannot, in the first instance, remove fluids from any other parts but from the stomach and bowels; but *secondarily*, it may remove them; for the removal of the fluids of the alimentary track puts the absorbents to work to take up the fluids from other parts to make up the deficiency, and thus the legs become lessened. From what has been stated of the operation of purging, it is clearly an error to suppose likewise that what are called *humours* are passed off in purging; or that hard riding is necessary previous to a purge to stir up these humours. A definite distinction has been attempted to be drawn between a laxative and a purgative; the former being characterised as merely the evacuation of the intestinal contents, and the latter as the increase of the secretion of the intestinal surfaces to supply an additional quantity of evacuated matter. As a means of expressing a greater or less degree of stimulus applied to the intestines (i. e. a weaker or a stronger purge), the terms laxative and purgative are useful and convenient; but as every degree of these acts is dependent on a *stimulus* applied to the bowels, whereby their peristaltic motion is increased, so nothing more definite can be understood to apply to them; and it is only in this sense they are to be viewed whenever they occur here.

The *uses of purging medicines.*—These are various, but may be arranged under—such as are given remedially against an *existing* disease; those exhibited as a *preventive* against a *probable* one; lastly, they are very generally in use for *promoting* a certain state called *condition* (which see). Remedially, catharsis is most beneficially employed against inflammation, or most diseases of increased action, except of the alimentary track: by increasing the waste of the watery parts of the blood, it depletes the system, and lessens arterial action. In active inflammation it greatly assists bleeding, and in some cases it is superior to it, and can be advantageously employed when that cannot be with propriety attempted, as in fevers possessing a low or putrid character: for as such appear to be often dependent on some morbid change within, or some morbid combinations formed by the biliary fluid, which purging acts particularly upon, so its advantages here are striking. In the plethoric states, which produce serous deposits in the legs, &c. as in horses just removed from grass, &c. &c., we depend on purgatives for their removal. In pursive thick-winded horses, physic not only prevents further accumulation, but also stimulates the absorbents to take up some of the existing deposit. In dyspeptic cases, in hide-bound, in lampas, or other affections arising from deranged functions of the stomach, mild purgatives act in the most salutary manner. In the removal of worms also they act beneficially, by ejecting them and the nidus in which they are lodged also. As *preventives*, purges are extensively employed also, when horses are taken from grass or straw-yard, and are at once removed into a heated temperature, with clothing and a full diet. Were it not for bleeding and purging, but particularly the latter, we should find all the consequences of plethora shew themselves soon after; as hide-bound, surfeits, swelled legs, cracked heels, ophthalmia, and not unfrequently inflamed lungs also: here, and in all similar cases, purgatives find a vent for the superabundant blood formed. It is another fact which serves to exemplify the want of analogy between the action of purgatives on the horse and those on the human subject, that, when an emaciated horse is removed from hard work and harder fare at once to rest and a full diet, so far from his condition being improved, unless he be prepared for the change by previous purging, his skin becomes fixed, his belly still more and more tucked up, and his hair will often actually fall off. But the same change, when accompanied by a judicious use of purgatives, operates so much to his advantage, that a few weeks brings forth a new animal, as it were. Physic is also most beneficially given at particular seasons, as at the spring and fall, to obviate the effects of the contradictory state into which horses fall at those times; being then apparently weak and emaciated, yet at the same time suffering from increased arterial action, employed in working the periodical change in the constitution. At these times two or three mild purges will stimulate the defective digestion, remove morbid accumulations from the bowels occasioned thereby, and, by a sympathetic effect between the skin and alimentary canal, they will assist in the change of the new hair for the old.

Purgatives are given to promote condition.—If their tardiness of action altogether shut them out from any other medicinal use, yet their beneficial influence in producing condition would, of itself, render the subject important to all those connected with horses. If, likewise, they excited only the condition we require on the young, the robust, and the already lusty animal, it would excite little surprise, and the *modus operandi* would be clear; but when we know that they equally promote it in lean emaciated horses, even without apparent disease, it requires an intimate acquaintance with the æquine functions, and his animal economy, to enable us to account for the fact. In such cases we give mild doses only, which prove a valuable stimulant and tonic to the stomach and bowels, thus promoting their digestive powers, and consequent capability of separating more organic moleculæ from the ingesta. They also stimulate the sluggish biliary and pancreatic secretions, which are so necessary to a healthy digestion and formation of chyle, from which alone the strength and bulk can be augmented. Luxury and refinement have introduced an artificial state of *condition*, beyond that simply implying a healthy functional state. Such condition is not only necessary to bring the animal up to our present ideas of beauty, but also to enable him to undergo exercises which, in a state of nature, were not expected of him, as hunting, racing, &c. &c. To promote this state, purges are indispensably necessary, and it is from this view that the subject of physicking derives its popularity with the mere horseman; though we have shewn that it derives no less consideration under every point of view connected with the well-

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[illegible] five days previous, three, four, or five drachms of aloes will work them sufficiently, and not pull them down: it is also, with very delicate horses, admissible to divide the dose, allowing six hours between. It is doubtful, without some 'foulness,' as it is termed, or rather cuticular symptoms of extreme fulness and plethora be apparent, whether, in ordinary cases, two moderate doses be not all that is necessary to ensure the condition of most saddle and carriage horses. It is an unfortunate prejudice, engendered by ignorance and kept alive by obstinacy, that to do much good with physic it should be very strong. I was once told by a groom, that the dose I dispensed was not strong enough, for it had not purged the horse more than fourteen or fifteen times; and I have been also told that two ounces of aloes was but a moderate dose. I have very seldom met with a horse I would not effectually purge with less than half the quantity, by full preparatory mashing, which, be it observed, ought in every case to be done for two or three days previous to giving the aloetic ball; by doing of which, it is very seldom that the operation rakes or distresses even young and tender horses. In many cases, however, these sapient gentry, the grooms, are not satisfied unless a horse have twenty or thirty evacuations. Super-purgation has destroyed hundreds of horses, and it has irreparably injured thousands: it certainly debilitates the horse more than man, probably from a lax state of bowels being more common in man, owing to the presence of both cystic and hepatic bile, as well as a dependent situation of bowels. It is hardly possible to conceive a more deplorable object than a horse under the action of an enormous purgative: the liquid aliments escaping almost involuntarily from a red protruded anus, excoriated with the violence and frequency of the dejections; the belly drawn to the flank, cold sweats bedewing the frame, appetite totally lost, and the strength so lessened as to leave the animal hardly the power of tottering from one stall to another; and yet to this state does the obstinacy and ignorance of an infinite number of grooms doom the horses of their owners. The number and strength of the purgative doses are not the only evils also to which the horse is liable, from improper purgation; the articles used are likewise often of an injurious nature. Frequently with the coarsest aloes the groom's prescription directs other drastics, purposely to increase the strength; and if he omits these, he will attempt to increase its effect by adding soda or other alkaline, not considering that they act on the kidneys, and thus lessen the catharsis he wishes to excite. Neither are grooms, or indeed some practitioners, so attentive to *previous preparation* as they should be: a powerful dose of physic put into a horse from hard work and full keep, without previous mashing, hurries the hardened fæces forwards until it forms them into an impenetrable mass: inflammation ensues, and on the third day the horse is found dead, and swollen immensely No horse should have a *strong* dose of physic put into him without two or three days previous mashing; and if this be done, a mild dose will be sufficient. In hot weather, inflammation supervenes on physic, when at all too active; and dysentery is a very common consequence of summer purging. When good physic has been properly given, still it is often rendered injurious, and even destructive, by carelessness or ignorance. Cold water given at these times will injure; a sudden chill from a door left carelessly open may bring on enteritis; and immoderate exercise, to promote a 'stirring up of the humours' has destroyed many a valuable animal.

Of the articles used in purging of horses.—A great discrepancy of opinion prevails on this head also, but, if the distinction between laxatives and purgatives be maintained, it would tend to reconcile these contentions. There are numerous articles which simply *relax* the bowels, i. e. slightly increase their peristaltic motion; but very few which produce active purgation. Of the former, bran, calomel, neutral salts, castor, linseed, and olive oils, are the most usual instances; but it must be confessed that, with the exception of bran, all the others occasionally fail. Rhubarb, jalap, colocynth, and elaterium, are inert, except in such doses as derange the bowels dangerously, and, therefore, it is evident how uselessly these enter into the formulæ of purges for horses. Some further account of these several substances will appear in the *Veterinary Materia Medica*, at the end of the work. Gamboge, which is also added to horse physic, is a still more dangerous addition, for it sometimes proves a most drastic purgative, and in others is totally inert. The purgative of the horse, therefore, in almost every instance, is aloes. Lately, however, there has been added to the list of effective æquine purgatives the *croton tiglium*, of which anon. Much difference of opinion exists on the preference due to the various kinds of aloes; nor can we ever arrive at a just conclusion on this head, until we unite a conclave of *honest* druggists, both wholesale and retail, from whom alone might be procured something like a knowledge of the various sorts *unadulterated;* and until we are better informed of the original state of these articles, or until we can get them of real purity, our written accounts can be little depended on; for, if I be not mistaken, they are all mixed and remixed to suit the convenience of the dealer; and are named and re-named, to suit the wants of the purchaser; to which circumstance we are indebted for the contradictory accounts we read relative to them. Of the aloe varieties two are principally in use; the hepatic* or Barbadoes, and the cabaline* or Cape. The Barbadoes are somewhat quicker and stronger in their action, and consequently rather more drastic in their operation than the Cape, and therefore in some cases are not to be preferred. But as they are in general more certain in their action than the Cape, I have commonly made use of them. Cabaline or Cape aloes are used at the Veterinary College, which tells in their favour, and they are generally thought milder and

* The names hepatice and cabaline are frequently used to signify aloetic admixtures also of the various kinds, which may occasionally mislead in the dispensing or ordering of purges.

weaker; it is usual, therefore, to consider, that a moderate dose of physic, which requires six drachms of Barbadoes, should have seven drachms of Cape aloes. The quantity of aloes requisite to produce purging is dependent on so many circumstances, that it is no wonder if it should be so often mismanaged in ignorant hands; and this is one of the sources of the complexity and danger of physicking horses, except with those systematically accustomed to it. Horses do certainly vary greatly in their intrinsic capability of being acted on by purgatives, but much more in the circumstances under which they are given. Mr. Coleman, in his lectures, mentions a horse of his own that would purge by taking three drachms only of Cape aloes: while Mr. Percivall quotes a horse which belonged to Mr. O'Conner, veterinary surgeon, of Newmarket, which at three years old required fourteen drachms of aloes to purge its bowels These facts serve to shew the propriety of prescribing a very moderate quantity only as the first dose for a horse with whose constitutional peculiarities we are unacquainted. The requisite quantity is also greatly dependent on various other circumstances: old horses, and such as are constantly fed on hard meat, require more than others; while horses fresh from grass purge with a very mild dose, as do those used to bran mashes as daily food; and in all, by mashing three times a day for several days, we may make four or five drachms do the work of eight. This, I repeat, shews the extreme importance of *previous mashing* for all horses whatever, but particularly in weakly horses, and also in such as have been previously accustomed to much hard food. Form also influences the quantity requisite; a thin, narrow-chested, lank-sided horse, will purge more readily than a circular deep-carcassed one. It may be considered, therefore, that the quantities required to purge horses, both prudently and effectively, range between five drachms and ten; the extent of which range will serve to shew that something more is requisite than a blind acquiescence in any acknowledged recipe or invariable form.

The croton tiglium is a purgative of new discovery, and one which there is reason to hope is not, like many others, confined to man, but extends its influence to our present subject also. At present, however, the acquaintance with it is very limited, even among those whose opportunities are the most extensive, and consequently we can hardly wonder, that, while one is praising it as an article of vast import to the veterinary world, another has found it deceive his expectations. The cupidity of the drug dealers prevents us from ascertaining its true qualities; and few veterinarians agree in their opinions regarding it. In its action it is certain only in producing motions much more liquid than those produced by aloes, consequently we must suppose it weakens more. The capsule of the croton seed, I believe, has been found, if I be rightly informed, pretty generally unworthy of dependence on; as much perhaps owing to the tricks it is likely are already played with it, as to its own intrinsic want of energy. Mr. Youatt has tried it with variable effect; but altogether he does not appear prepossessed in its favour. Several others, I believe, have also tried it, without being able to come to a direct conclusion relative to its properties. Mr. Field has however found, that two drachms of the capsule have produced the same effects with forty grains of the farina, which is the remains of the kernel of the croton seed, after it has had the croton oil expressed from it. This farina, when genuine, appears to possess more certainty of action. Mr. Field, indeed, appears to exhibit it with equal confidence in its certainty and safety as in aloes: he estimates that thirty grains of it are equivalent to six drachms of Barbadoes aloes. The croton oil is probably equally certain in its action with the farina, but its extreme price amounts, at present at least, to a prohibition of its use, and indeed has prevented any data of quantity and quality being formed relative to it. Mr. Percivall suggests, that from forty drops to a drachm might be found the quantity necessary to fully purge; and he comes to the conclusion, that at a future time it may become a valuable addition to our veterinary list; but that as yet it presents no other apparent advantages over aloes but its diminished bulk, seeing it takes fully as much time to operate as aloes.—See *Croton Tiglium*, *Mat. Med.* It appears therefore, that, at present, aloes is likely to remain the prevailing purgative; and we shall proceed by offering, for the convenience of guiding the amateur and junior practitioner, the formulæ of three several strengths formed of Barbadoes aloes, to each of which from one drachm to one drachm and a half may be added, in case Cape aloes be preferred, which will equalise their action.

No. 1.—Barbadoes aloes* ... . five drachms
Oil of caraways .... ten drops.

Palm oil or lard, sufficient to make a ball.

No. 2.—Barbadoes aloes .... seven drachms and a half.

Add and mix, as the former.

No. 3.—Barbadoes aloes .... nine drachms.

Add and mix, as the former.

When it is thought proper to give mercurial physic for worms, or skin affections, two drachms of calomel may be given the night previous in a mash, first mixed with a table spoonful of flour. This, by lying all night in the horse, may, perhaps, assist its efficacy, particularly in case of worms; and the aloetic ball may be given the next morning; keeping in mind that it should be something less strong for the calomel already given.

Treatment connected with physicking.—The intestines should always be prepared for this operation by bran mashes, and which should be given two or three days previously, nor indeed should the physic be ever administered until the stools present some appearance of softening. The first dose given to every horse, with which we are not well acquainted, should be a very mild one, for some horses are much more easily purged than others; and if the dose do not operate, it can do no harm, as it is often most erroneously supposed to do. Exercise is of particular importance in physicking; but I would earnestly caution the attendants against active trotting or galloping: brisk and continued walking is all that ought to be allowed. The importance of exercise is by no means sufficiently considered; half the quantity of any cathartic, with plenty of walking exercise, will operate nearly as much as a double dose without; so that the degree of purging may be always regulated nearly to our wish, which is a very desirable circumstance. When physic does not work kindly, the exercise should be repeated at short intervals of two hours, till it does; and then it should be altogether omitted, as it would fatigue. Cold water should never be allowed, but, if the horse will not drink it warm, it may be given cool, but never cold: on this particular it is also necessary to observe, that ample dilution of the bowels is of the utmost consequence to insure physic working kindly. Entice the horse therefore to drink by every means, and by no means forget the necessary precaution of giving him pure water, from a perfectly clean pail: when it is either smoked or greasy, it cannot be expected that so nice an animal as a horse will drink. During the working of the physic he should be kept warm, both by the stable temperature and by clothing, and he must be exercised (if in winter) in clothes proportioned to the cold. *When a purge is to be given*, proceed as follows:—The horse having fasted an hour or two in the morning, give him the ball, after which he should be offered some warm water; or it will not be improper to let him have his ball a quarter of an hour after he has had about half his usual quantity of water; for it sometimes happens that the ball disgusts, and then he will not drink for some hours after, which is not so favourable to an early solution of the ball. After it is taken, he should be fasted one hour, or an hour and a half, when a small quantity of good hay may be allowed, or a bran mash may be given, with a very few oats sprinkled in it to make it palatable; he should, at noon, be walked for half an hour or an hour, with hay or mash feeding afterwards, and exercised again half an hour in the evening, being allowed warm or tepid water at intervals during the day, with hay and a bran mash again towards night. Early on the following morning the physic will probably begin to work, which, if it does briskly, no more exercise need be given; but if not, half an hour's walking should be allowed, when the horse may have a mash and warm water. After this, another half hour's exercise should be given (walking only), and which is to be repeated every other hour or two, till the physic work kindly, allowing mashes and a little clean hay occasionally, and warm water as often as he will take it. Should the horse appear griped and uneasy, a warm clyster of the common kind may be given, which will generally relieve with exercise, but do not repeat the clyster; and in the event of its still continuing, which will seldom be the case when good aloes are used, then the following drink may be given, hand-rubbing the belly well at the same time. (See *Colic.*)

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* Practitioners differ much as to the propriety of admitting any mixture of matters in their purging doses. Relative to the incongruous jumble of the old recipes, there can be but one opinion; but, are Barbadoes aloes rendered more mild by the admixture of the supertartrate of potash (cream of tartar) as Mr. Peall directs? or are carminatives a preventive to the griping quality of aloes in general? Mr. Bracy Clark strongly condemns all compositions with aloes; but as we know the horse bears spicy stimulants well (and he recommends them himself as stomachics), is it not reasonable to suppose them an useful addition to cathartics? A hurtful one, I believe, they cannot prove. On the subject of cream of tartar I have no experience, but I have much respect for Mr. Peall's opinion. It is however certain that soap is not altogether a proper means of making a mass of the aloes; it is somewhat diuretic, and therefore, as presenting a contra-indication, is better omitted, and some oleaginous matter used instead. *Memorandum.*—In every case the aloes should be at least roughly powdered.

Sound ale	a pint
Peppermint water..................................	a pint.

Mix, and give rather more than blood-warm.

It occasionally happens that, notwithstanding every attention, physic will not work on the second day, in which case let nothing tempt the practitioner, as has been done, to give another dose immediately; for it sometimes happens that purgatives will not act until the third day. But when a case occurs of non-purgation, always wait until the third day, when, if no symptoms of purging appear, either let the horse rest altogether for two days longer, and then give him rather a strong dose; or commence by giving him a quarter of the original dose every six hours till it purge, mashing, giving exercise and warm water as before. Let it also be remembered, that it is erroneous to encourage liquid purging to twenty, thirty, or more dejections. No good attends this practice. I never wish any horse I physic to have more than from twelve to fifteen liquid evacuations; all beyond this weaken the intestines and injure the horse. In the usual course of physic, on the next day after the operation of the purgative, the fæces will resume nearly their former consistency and shape, when the physic is said to be *set*. If it, however, continue to operate with nearly the same violence as on the day before, it must be regarded as a case of *super-purgation*, and recourse must be immediately had to the treatment already directed. (See page 396.) Otherwise, the horse may now return to his former habits, giving him corn at first rather sparingly, with moderate exercise; and, in five or six days from its setting, if the operation have been only ordinary, a *second* dose may be given, which is commonly required to be a *little* stronger than the first. After this, with the same caution, if it be deemed necessary, a *third* dose may be given; which is usually considered a course of physic: but the number of doses ought, as before pointed out, never to be under the arbitrary direction of custom, but should be regulated by the existing circumstances.

DIURETICS.

As we have but little power over the skin of the horse, so we have correspondently a greater one over the kidneys. In the human, the very reverse of this is the case, and the articles that do act on the human kidney appear to do it principally by a sympathetic effort of the stomach; whereas, diuretics in the horse, at least the greater number of them, appear to act primarily on the kidneys by determining a greater quantity of blood to those organs, stimulating them thereby to separate a larger quantity of water from it. The blood, losing an unusual poportion of its serum, or watery part, must be supplied from other sources: this is done by the absorbing vessels, which take up, in that case, any superfluous fluids they meet with to supply the deficiency; therefore, in swelled legs, in cracks, in grease, or in any preternatural enlargements occasioned by fluids, we give diuretics with great advantage. But diuretics have also a salutary operation in acute as well as in chronic diseases: for in lessening the aqueous portion of the blood, they must naturally lessen the distention of the vascular system generally; and therefore act like bleeding in all acute inflammatory affections: they also have a further beneficial influence on these cases, because they employ the vessels of the kidneys in an increased action of their secreting process, which may thus act as a derivative of inflammation; the heightened vascularity of the kidneys detracting, like a blister, from the force of the circulation in the diseased organ for whose benefit we give them. Like purgatives, they however are much abused, and irreparable injury is done to horses by their too frequent administration by ignorant and by idle grooms, who wish to keep their horses' legs fine without the trouble of hand-rubbing. In all accumulations connected with debility, it is evident that diuretics may do harm; the very nature of the diuretic being to call largely on the constitution, and that is already debile: we may, it is true, remove some extravasation and swelling to-day, but still more will return to-morrow. In these cases we must, on the contrary, strengthen the system by tonics, proper feeding, and mild exercise: the local debility we must aid by friction and bandages. When there is plethora, that is, when indications of a full habit are present, then serous accumulations in the legs may be very much remedied by a proper administration of diuretics; and it will be found that nothing aids their action so much as a liberal supply of water. While the kidneys are under the operation of a diuretic, the absorbents are opening their mouths in all the cavities, and over all the surfaces of the body; and it is known that they do so under these circumstances particularly: the call made by the kidneys cannot be supplied alone by water poured into the stomach; but it can engage all the other fluids also, and with this peculiarity, that when they are *actively* engaged in separating that only already within the body, they are apt to fall into apathy or inflammation; but mixed with the aqueous fluid received from the stomach, they go on vigorously in depleting all the serous cavities.

The *principal diuretic substances* in general use for the horse are, resin, nitre, turpentine, potash, and corrosive sublimate. The milder ones are digitalis, tobacco, squills, cream of tartar, neutral salts, juniper, &c. Many other substances act on the kidneys of the horse, but in a less degree. *Digitalis* is peculiarly applicable to highly inflammatory affections either with or without nitre. *Resin* is, perhaps, the most active diuretic in veterinary practice, and, in a dose of three to six or eight drachms, is very certain in its operation. *Nitre*, in similar doses, is equally certain, but a little less active. In inflammatory diseases, and in urinary obstructions from gravel, it is also much to be preferred to resin. *Turpentine*, both liquid and solid, are certain diuretics; as also is *potash*, half an ounce or an ounce being diluted in two or three quarts of water, and given fasting. *Corrosive sublimate* proves a powerful diuretic, in doses of half a drachm to a drachm; but it is evident no such quantity should be given for this purpose, without first ascertaining that a lesser dose can be borne with impunity. I am disposed to think that the diuretic effect here produced is through the medium of the stomach alone, and not by its primary action on the kidneys; although mercury in all its forms increases the action of other diuretics, in the horse as well as in the human. As a mild diuretic, the *foxglove* is a good one, in doses of one drachm to two; but it requires to be repeated at daily intervals to become certain in its effects. In similar doses, *tobacco* proves a diuretic, but it is less certain even than the digitalis; *squills* are the same. *Cream of tartar*, to prove certain in its action, must be given in doses of four to six ounces. All the *neutral salts*, in similar doses, act in the same way; but not always with uniform certainty. When they prove aperient, the flow of urine is in general inconsiderable, but it lasts some time. When strong diuretics are used, it should not be forgotten that they act by over-exerting an important organ; so a frequent repetition of them may prove very injurious, and can only be warranted by some very urgent circumstance, as ascites. The unobservant are but little aware how very seriously too powerful and too often repeated diuretics injure the horse; for great debility and emaciation very usually follow when given in these extremes. Whenever a diuretic is given, the same cautions should be observed as with a purgative: to keep warm, but not hot, sweating would impede the process of the diuretic; to avoid over-exertion; but, above all, to allow a large quantity of tepid water, which greatly increases the effect, and renders the action less hurtful: indeed, a large quantity of water will of itself prove a diuretic, particularly if the horse have previously fasted from it. This phenomenon alone is sufficient to shew, that largely diluting the stomach acts *sympathetically* and not *mechanically* on the kidneys: that is, not by merely throwing a superabundant quantity of water into the system, which must be got rid of in this way. When a horse has long fasted from water, his other secretions must have lessened the watery parts of the blood so much that it would seem to occasion an imperative call for dilution; and in such case it would, *à priori*, be supposed, that whatever fluid aliment was then taken, however large the quantity, would be received into the system to repair the waste. But it is not so; on the contrary, whatever may be the wants of the constitution by long deprivation from liquid aliments, a full dilution, instead of being at once taken up to repair the waste, greatly increases the urinary flow by constitutional sympathy and venous or lymphatic absorption. It is, therefore, clear, that whenever we deprive horses of water during the action of diuretics, under a supposition that we thereby increase the absorption of the extravasated fluids, we err greatly; and instead, we have every reason to conclude, that by whatever means the urinary secretion is excited, by such means interstitial absorption is likewise promoted as a necessary consequence. Diuretics are given in the form of *balls* or of *powders*, a formula of each of which is added:—

Diuretic Balls.

Resin, yellow	four pounds
Nitre, in powder.................................	two pounds
Horse turpentine	two pounds
Yellow soap	one pound.

Melt the resin, soap, and turpentine over a slow fire; and when cooling add the nitre. Strong dose, one ounce and a half to two ounces. Mild dose, six drachms to eight. The former may be given once a week; the latter every third or fourth day.

Diuretic Powders.

Yellow resin, powdered	two pounds
Nitre, ditto	four pounds
Cream of tartar, ditto	two pounds.

Dose, six drachms to ten or twelve, twice a week, in a mash.

PART THE FOURTH.

THE
VETERINARY MATERIA MEDICA;

OR,

An Alphabetical and Descriptive List

OF THE VARIOUS

MEDICINAL ARTICLES AT PRESENT EMPLOYED

IN VETERINARY PRACTICE.

THE

VETERINARY MATERIA MEDICA, &c.

THE practice of the Veterinary Art requires medicaments to combat the numerous diseases to which the more important quadrupeds domesticated around us are liable. It was only lately that an excellent scientific digest of these medicaments, bearing the title of a *Manual of Pharmacy for the Student of Veterinary Medicine*, was published by Mr. Morton, under the sanction of the Veterinary College. Without materially interrupting my former manual, I shall make such use of this as will prove beneficial to the student of animal medicine. Nor can I do justice to gentlemen pursuing their studies in the curative treatment of animals without strongly recommending this work to their notice, and also to an attendance on Mr. Morton's lectures on the Materia Medica. A well-grounded knowledge of chemistry is necessary to the proper construction of the formulæ used among us; and without it we are apt, by injudicious combinations to destroy the effect of our remedies, or otherwise to beget new compounds of totally different qualities to those intended: probably noxious ones are produced. On the other hand, an intimate knowledge of the chemical affinities of each will enable the practitioner, out of articles apparently dissonant in properties and action, to form a new article with particular powers suited to his purposes. We, nevertheless, have occasion sometimes to make very unchemical mixtures, which must of necessity decompose each other, were they mixed in a state of solution: such would be the case with the superacetate of lead and alumine, or, in other words, with Goulard's wash and alum, which I have often seen prescribed, and have probably often done it myself. But these and other dissonants might unite their qualities favourably in the shape of an ointment, or when made into a ball. A wash compounded of tincture of opium, and either superacetate of lead, sulphate of zinc, or cinchona in solution or infusion, would have the opium wholly precipitated; and yet how common it is to mix an eye collyrium thus! There is, however, one thing to be taken into the account, that even these apparent incongruities must not lead us to reject the use of formulæ whose benefits have stood the test of many years, and whose virtues are as notorious as that turpentine is a diuretic: for there may be a sort of gastric chemistry which prevents the decomposition so much dreaded, or again disunites those affinities the mixture had operated[*]. I am fully aware that some, perhaps several, of the recipes in-

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[*] On the subject of polypharmacy, or the compounding numerous articles together, much difference of opinion exists; though the fashion of the present day rather leans to the practice of the ancient school of Cos, of employing single articles of the most simple nature, contrary to the recipes of the Galenic pharmacopœia. Fourcroy said, 'that the *mixture* and *confusion* of medicaments was one of the greatest obstacles medicine had to surmount.' But, in reply, mixture does not necessarily imply confusion; and Dr. George Fordyce also said, 'that the union of several medicaments having the same tendency, increased the efficacy of each.' We have medicinal articles which are best alone, we have others which are most efficacious in combination: but, as a principle, when we return to single articles in general practice, to the exclusion of compounds, we shall be encouraging empiricism, and entering on the confines of a specious barbarism. It is also fashionable to throw ridicule on all attempts at *classing remedies*: many of the terms, and many of the distinctions, which have been used are sufficiently incongruous, without doubt; but are there no sedative, no tonic, no absorbing, no stimulating remedies? Is a mere fanciful rage for simplicity to deprive us of the benefit of arranging our remedies under terms appropriate to their characters; and which terms are so essential a part

introduced in the body of the early editions of this work are not strictly chemical; and were I again to enter into the art of prescribing, I should probably render them more accordant with the rules of pharmaceutic chemistry; but I was unwilling to correct that which I knew by experience to be good, they having stood the test of nearly thirty years' trial. I have now introduced others [illegible] as a series of observation and experience have shewn the efficacy of; I have likewise continued them under the old names, having also added the new, which in a future edition will probably then have become familiar, and take the [illegible] place of the former.

In the exhibition of medicines, the veterinary practitioner is in a much worse situation than the human. The former not only derives no assistance from the [illegible] of the feelings of his patient, but the specific action of medicines administered is totally different in the several objects which fall under his care; in many cases they bear no analogy with each other. At this moment I know an eminent physician who destroyed a valuable pointer by giving him ten grains of calomel; observing to me afterwards, 'Bless me! I have often given a woman as much, and here is a dog killed by it.' A veterinary surgeon also destroyed a favourite dog with twelve grains of emetic tartar, and remarked upon it, that his only fear was, that he had not given enough. Here both erred, because they 'travelled out of the record;' to the former we might say, *ne sutor*, &c. The latter is now wiser, I dare say, because our knowledge is more diffused. To the dog, it may be remarked that it is very frequent for sportsmen to give with impunity extraordinary doses of active drugs, the half of which would inevitably destroy: but it is not the safety of the dose, it is the quantity which irritates the sensitive stomach to its immediate ejection, and the dog escapes. It was thus that a man who took two ounces of arsenic escaped, when thirty grains would have proved fatal. Dogs, for the information of the practitioner, cannot with impunity take of the mineral acids, or of calomel, or of tartarized antimony, more than the human subject: they are omnivorous, like ourselves, and their digestive organs are thus equally inimical to these articles; but further the analogy fails, for the dog may be made to puke with two drachms of opium, but it will not destroy him. Again, the dog will take a drachm to a drachm and a half of aloes to purge him; but his athletic master would be almost raked to death by a quarter of the quantity; and the largest hog in his stye would probably be killed by it. At the same time, an ounce and a half even, suspended in water, has been given to a sheep without producing any effect. Cows will take, on some occasions, even more; but in general this quantity would purge a cow sufficiently, two ounces most copiously. Tartarized antimony can be taken with impunity by the following animals in the quantities mentioned:—From one drachm to three have been given to sheep; from one ounce to two to cattle; and from two ounces to three to horses; when, as before observed, the hog would be vomited with three or four grains, and the largest dog with six. Cantharides, as a remedy, is equally irritating and dangerous to all these: but the hedge-hog, as Mr. Youatt informs us, will eat as many as would destroy a whole regiment of soldiers, and suffer nothing. If one was caught after such a meal, and dressed

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of the language of our art, that pathological and therapeutical description could not go on without them. Consequently, if they are necessary images, they must have identity and a necessary purpose. Morton, on the Veterinary Materia Medica, observes that the immediate action of medicines on the tissues with which they come in contact is the most simple, and generally the most advantageous. Their effects, however, are not confined to this place, but by contiguity of tissue, or by absorption or sympathy, they exert a more extensive influence. Of this influence, communicated by contiguity of tissue, we have frequent proof, as when we calm the inflammation of the mucous surfaces of the respiratory passages by emollient drinks, whose sedative effects are transmitted to these passages through the medium of the pharynx, with which the drink comes in contact; and also as emollient cataplasms applied to the loins in inflammation of the kidneys, extend their soothing influence through the medium of the intervening tissues. 'Of all the means by which medicines extend their action, there is no one so general or so complete as absorption: they are carried into the circulatory current, and conveyed with it to every part of the frame, and thus exert a direct influence on the whole organization. Salts of iron and copper, and resinous substances, administered by the mouth, have been speedily detected in the blood by chemical analysis. Their stay in the circulatory vessels is ordinarily of short duration; for if they cannot assimilate themselves with some organ or tissue, they are discarded by the natural emunctories. Thus the cutaneous perspiration and pulmonary exhalation betray the odour of ether, the milk obtains the bitterness of wormwood, and the urine is charged with certain metallic oxides.'

with his *trail* like a woodcock, I should suppose the meal might be more piquant than wholesome: this fact, however, shews how necessary it is that we dispense medicines only from experience, and not from analogical conclusions. Jalap, rhubard, and senna, are not purgative to the horse, cow, or sheep, although so active in promoting catharsis in ourselves. The human subject can take three times as much oil of turpentine as the largest dog; and it was from reasoning by analogy that a surgeon destroyed a stout spaniel by one or two drachms only, and the death was instantaneous. The quantities of acrid minerals which horses, cows, and sheep even, take to destroy them, would stagger us, were it not for our acquaintance with their struotural peculiarities: the one has a cuticular lining to his stomach, and the poison there becomes neutralized before it is received into the constitution. The ruminant is similarly situated, because any acrid matter has to pass into other receptacles before it is received into the digesting stomach, particularly when given in a solid form: whatever is received in a liquid form, takes a more direct course, as necessarily regurgitated, and hence is usually more active. From this consideration we become impressed with the necessity, or prudence, at least, of giving our cattle medicines in a liquid form.

I would particularly recommend to the veterinarian commencing practice, to have a neat and well-regulated dispensary: except that the matters need not be quite so numerous, it should be a fac-simile of a well-arranged apothecary's shop. The various articles should be inclosed in drawers, pots, or bottles, according to their forms or properties: each should be separate, and each should be distinctly marked. Above all, it behoves him, if he wish either to satisfy himself, or to do justice to the cases under his care, to be most particular as to the *quality* of the *simples* and *compounds* he uses. On this, too much stress cannot be laid; for it has been justly observed, 'any thing is thought good enough for a horse;' and hence no medicinal articles are so shamefully adulterated as those intended for his use. The prudent veterinarian will find it his interest to deal with a druggist of established reputation, and to order none but genuine drugs, and of the best quality. At the present day, I should hope I need not caution him against the wretched trash offered under the names of *horse powders* and *horse oils*. These articles can be sold at any price; for they are very generally adulterated by farriers' druggists, to suit the pocket, the credit, or the tastes of their customers, whose usual ignorance of chemistry and pharmacy makes the imposition the more easy. The only means to avoid such deception is to compound for himself; and to do it with the best drugs. In the *formulæ*, and *doses*, the apothecaries' weights and measures are always meant, a table of which is added as a guide. I would also recommend to those whose knowledge of pharmacy is limited, to procure a complete set of apothecaries' weights and measures, marked and graduated in *English* characters, as they are now generally sold by London scale-makers, which prevents the possibility of mistake. The various articles are mostly described under their chemical and pharmaceutical names; but I have, at the same time, inserted the popular terms by which they are known, so that a more ready reference may be made, while the general order of description will lead to an assimilation of this with its parent art of human pharmacy. For the convenience of the junior practitioner we have inserted the *compounding* tables, but we would refer the medical practitioner to Mr. *Morton's Veterinary Pharmacy* for a most excellent *exposé* of medicaments generally, and particularly of those employed at the Royal Veterinary College. One of that gentleman's *little tomés*, and one course of that gentleman's *Lectures on Veterinary Materia Medica*, will greatly aid him in attaining all the requisite information on the subject alluded to.

A TABLE OF THE WEIGHTS AND MEASURES GENERALLY USED IN THE COMPOUNDING OF MEDICINES.

WEIGHTS.

The Pound	contains	Twelve ounces
— Ounce		Eight drachms
— Drachm		Three scruples
— Scruple		Twenty grains
— Grain		

MEASURES OF FLUIDS.

The Gallon	contains	Eight pints
— Pint		Sixteen fluid ounces
— Fluid ounce		Eight fluid drachms
— Fluid drachm		Sixty minims or drops

ABBREVIATIONS.

Gtt. or Min.	for	Drop
Gr.		Grain
℈		Scruple
ʒ		Drachm
℥		Ounce
℔		Pound

The medical compounder of drugs hardly need to be informed, that they are bought and sold by what is called Avoirdupois weight, which is thus clearly stated, because, to use Mr. Morton's exposition, it does appear that, whether the purchaser of drugs be furnished by Troy or Avoirdupois, is often little attended to: by which, in compounding of medicines, much error is likely to be committed; as will be apparent, when it is considered that a pound Avoirdupois contains 7000 grains, and the ounce 480 grains. A pound Troy, on the contrary, contains 5760 grains only. It therefore behoves the veterinary practitioner to be fully aware of this, both in the purchase, the sale, or the administration of his drugs.—See *Introduction to Veterinary Pharmacy*, 2d Edition.

Absorbents.—The efficacy of this class of remedies is supposed to consist in their tendency to correct a diseased acidity in the stomach; but as this organ in the horse has but a small portion of secreting surface, so he is less liable to affections of this nature than many other animals. In horned cattle, complaints apparently originating from this course are more common; hence cows, calves, and sheep, are sometimes benefitted by chalk; which is the most usual antacid in veterinary practice. Dogs, also, are fit subjects for their exhibition.

Acetated Liquor of Ammonia.—This has been long known by the popular term of Mindererus's spirit, and is made by pouring a quart of vinegar on an ounce of volatile salt of ammonia. It may be also made by taking any quantity of carbonized spirit of ammonia (*spirit of hartshorn*), and adding vinegar to it till it tastes neither salt nor sour. I consider it useful in horse practice; it gently invigorates, is diaphoretic, and sometimes it proves mildly diuretic. It principally shews its salutary effects on the commencement of the debile stage, or at the close of lingering febrile diseases, particularly of the epidemic catarrh; in which cases it may be combined with camphor, and also with powdered chamomile (see Chamomile). In the more early stages of epidemic catarrh, it may be united with nitre and oxymel; and though the mixture be somewhat unchemical, it is often strikingly beneficial: the dose is from four to six ounces. In slight strains it forms a useful external application also.

Acetate of Copper, or Verdigris.—See Copper.

Acids, in chemical language, form a class of salts gained from the animal, vegetable, and mineral kingdoms. Such as are in use in veterinary medicine are described under their proper names throughout the *Materia Medica.*

Ægyptiacums are Mixtures of the acetate of copper (*verdigris*) and honey, sometimes with vinegar, borax, alum, &c. The simple ægyptiacum is used for ulcers of the mouth, the others for grease, cracks, &c.

Ærugo.—See Acetate of Copper.

Æther.—The volatility as well as the value will ever prevent the sulphuric æther from coming into general use in veterinary practice; but the more dilute preparation of it, called *spirit of sulphuric æther*, may be often used with great benefit in spasmodic colic, in addition to the other means. The *nitrous æther*, or sweet spirit of nitre, as it is called, is a more general remedy, and will probably become still more so as it is more known. As a febrifuge, it is at once refrigerating without lowering. (See Nitre.) A drachm of sulphuric æther to eight ounces of rose water makes an excellent collyrium for the latter stages of ophthalmia.

Æthiops Mineral.—See Mercury, Black Sulphuret of.

Alisma Plantago was supposed to have both a curative and preventive power over rabies; but although it appears to quiet the present fury, it has not proved ultimately beneficial.

Aloes.—These form a very important article in the veterinarian's list of medicines, and therefore too much care cannot be taken to procure them genuine. Every practitioner, however, should purchase them in the gross, and have them reduced to powder under his own inspection, as the surest preventive against adulteration. Aloes are of three kinds; Socotrine, Barbadoes, and Cape. Formerly the Socotrine were recommended, and the other kinds condemned as unsafe: but the Barbadoes are now in most request, as being the most certain in their action; principally, I believe, because they are less adulterated. Socotrine aloes appear in colour compounded of red, brown, and yellow; are very brittle, and fragrant to the smell. Barbadoes aloes are of a deeper tint, less brittle, less fragrant, and more intensely bitter. Cape aloes in appearance hold a middle place between the two, and indeed what are so called are in many instances compounded by druggists of the refuse of both, and to which perhaps may be attributed much of their uncertainty. The action of each kind as a *purgative* is detailed under the head *Purgatives.* As an alterative, a stomachic, or a vermifuge, aloes are sometimes given in doses of one drachm to two daily; they are also used in similar doses as a nauseant in inflammations, but are not uniform in their action, and are apt to irritate. As an external detergent and stimulant application, they are used in the compound tinctures of myrrh and of benjamin, called Friars' balsam. Aloes form a remarkable instance of the different properties of the same article over different animals. A horse requires an ounce, an ox two ounces or even more, to purge him; a dog can take a drachm; a man cannot bear half that quantity; and the largest hog not even so much: while, according to the experiments of M. Gilbert, a sheep which took two ounces was not purged, although it died seventeen days afterwards. Aloes, particularly the Barbadoes, will not pulverise readily except in frosty weather, at which time a sufficient quantity should be done to last the year through; and as they are apt again to unite into a solid mass, so, as soon as powdered, they should be mixed with some soft ingredient. I have always used for this purpose half their weight of lard or palm oil: mixed in this manner they keep well, and form a uniform mass of a proper consistence to make balls; which dissolves readily in the stomach, never hardens, and is, I think, less apt to gripe than any other form, particularly if half a drachm of powdered ginger be added. Soap is not thought, by some of our most scientific practitioners, a good article to entangle the aloes; and though it has been introduced partly to assist the solution of the aloes in the stomach, yet, by its diuretic properties, it must somewhat interfere, though probably slightly only, with the purgation by exciting the kidneys. Under this view, the introduction of soda, as a direct diuretic, must certainly be more objectionable. Aloes are now boiled by some practitioners, to render them more mild. The great difficulty of keeping aloes in an equal state of consistence, as a purging mass, induced Mr. B. Clark to adopt the following method, by which, he informs us, these inconveniences are obviated. He places one vessel within another, exactly as carpenters melt glue, having water in the outer vessel, and aloes with one-fifth of their weight of treacle in the inner one, which is carefully covered with a lid. The apparatus being put on the fire, is suffered to remain, the aloes and treacle being now and then, but not too often, stirred to combine them, for an hour or more, or until perfectly melted. The inner vessel being now taken from the outer, the contents are expeditiously cast in paper moulds or tubes, of the usual diameter of a horse ball. When cold, Mr. C. finds these balls flexible, yet solid, and that they remain so. He gives an ounce to a saddle or carriage horse, and ten drachms to a cart horse: but there is reason to fear that they do not prove so soluble in the stomach as when their particles are divided by oil, lard, or even syrup, but which is a more objectionable ingredient than either of the others.

A watery solution of aloes should be kept by every veterinarian, and which will be found, in many instances, a very convenient form, as well as desirable, on account of its quicker action. It may be made by grossly powdering a pound of the mass, and infusing it, in a warm place, in one pint and a half of proof spirit for three or four days; after which add soft water two quarts, and bottle for use. When to be taken, shake the vessel containing it, and give sediment and all, in doses of two, three, or four ounces, as the case may require.

A spirituous tincture of aloes, made by digesting four ounces of the powder in a quart of proof spirit in a sand-bath, forms an excellent stimulating application to sinuous sores, recent wounds, &c. Half an ounce of powdered myrrh is a good addition to this vulnerary.

ALTERATIVES are articles that are supposed to act medicinally on the body, in a slow and nearly imperceptible manner. The usual alteratives among farriers are nitre, antimony, sulphur, resin, and spices; but a better acquaintance with the art teaches us to add mercurials, mineral acids, foxglove, wood barks, aloes, with some of the gums, and gum resins: a change also in the food becomes, in some instances, a powerful alterative.—*Nitrated potash* or *nitre*, in doses of two to six drachms, increases the urinary discharge, and thus becomes an alterative, by gently decreasing the accumulation of fluids in swelled heels and other œdematous enlargements. *Antimony* is given in several forms: the sulphuret, or what was called crude antimony, has been long a common alterative: it is still given in doses of two to six drachms in skin affections, as hidebound, &c. Antimonial powder, and tartarized antimony, called emetic tartar (see ANTIMONY), are also alteratives of a diaphoretic quality, in doses of one to two drachms.—*Resin* is an active and useful diuretic alterative, in doses of two or three or four drachms; but it simply empties the system, while nitre is a refrigerant also. The supertartrate of potash, known as cream of tartar, is an excellent alterative, particularly in conjunction with mercurials and sulphur, in skin affections, as surfeits, &c. &c.—*Spices* are often too freely used by ignorant persons to produce a fine coat; but in judicious hands they become useful alteratives, by their invigorating and tonic quality.—The submuriate of mercury, or *calomel*, is useful in all herpetic affections, and as a vermifuge also, in doses of a scruple to a drachm; but its effects must be watched, or salivation may unexpectedly come on.—The oxymuriate of mercury, or *corrosive sublimate*, may likewise be given in similar cases, and in farcy, glanders, grease, &c., in doses of ten grains to a scruple, watching its effects even more attentively than the former, as, in addition to salivation, it may produce inflammation of the stomach.—*Arsenic* is not only given with the same intents as the last article, but as a tonic its effects are also considerable, particularly in cases of protracted debility from chronic diseases: it is likewise a useful vermifuge. The dose is the same as of corrosive sublimate, and similar cautions are to be observed in its exhibition.—Foxglove is likewise a useful alterative in watery accumulations, in doses of two scruples to a drachm. Diuretics, diaphoretics, laxatives, stomachics, and tonics, may be all likewise considered as alteratives. *See these articles.*

Alum *(Alumen).*—This compounded body of sulphuric acid and pure argil is in very general use in veterinary practice, both externally and internally. In doses of one or two drachms, it is a useful astringent in diarrhœa, diabetes, and other fluxes; it also possesses some virtue as a stomachic. Externally it is used as a styptic to stop hæmorrhage, by sprinkling it on the bleeding orifice, when its coagulating properties plug up the mouth of the vessel. It is a useful escharotic to destroy fungus, and a valuable detergent for foul ulcers. It is also a useful stimulant in inflammations of the eye; and a whey made of it forms a good astringent clyster. When it is burnt, it is rather milder, but its properties are not otherwise materially altered.

Ammonia crude *(Ammonia murias).* It is called crude, to distinguish it from the volatile or prepared ammonia which follows. It is, in my opinion, one of our very best discutients, and, when in mixture with acetic acid or vinegar, it forms the *saline embrocation* mentioned in the body of the work. (See Embrocations). From it are prepared

Ammonia volatile (ammonia subcarbonas). The gaseous ammonia, fixed into a solid form by combination with carbonic acid, forms the volatile ammoniacal salt of the druggists. It has been said to be a good stimulant in the latter stages of fever; but I have never tried it alone: united with vinegar, it forms the spirit of Mindererus, a most excellent human febrifuge.

Ammonia acetatis (acetated liquor of ammonia) is made by pouring a quart of vinegar on an ounce of volatile salt of ammonia; it may be also made by taking any quantity of the carbonated water of ammonia, or spirit of hartshorn, and adding vinegar to it till it tastes neither salt nor sour. I consider it as a very important medicine in horse practice; it gently invigorates, is diaphoretic, and sometimes it proves mildly diuretic. It principally shews its salutary effects on the commencement of the debile stage, or at the close of lingering febrile diseases, particularly of the epidemic catarrh; in which cases it may be combined with camphor, but more effectively with powdered chamomile (see Chamomile). In the more early stages of the epidemic catarrh it may be united with nitre and oxymel. The dose is from four to six ounces. In strains and ligamentary lamenesses it forms a very useful external application also.

Carbonate of Ammonia is called salt of hartshorn; carbonated water of ammonia is the spirit of hartshorn of the shops. It is convenient in veterinary practice, from its peculiar property of uniting oil and water. Internally, it is an antispasmodic, in doses of eight to ten drachms. United with acetous acid, or vinegar, it forms an excellent diaphoretic febrifuge; and in conjunction with equal parts of oil it forms the *volatile liniment*, which is a warm discutient application, much used for sore throat and indurated tumours.

Ammoniacum.—This *gum* is sometimes given in old obstinate coughs, but I have no evidence to offer of its efficacy.

Anise Seed.—The powder of these seeds was formerly much used by farriers, and the druggists who make *horse powders* find it a profitable article; for it is adulterated to one-third only of the genuine powder. It may be very properly united with other warm aromatics when cordials are admissible. It is also thought to possess some pectoral properties, but they are very trifling. The essential oil is the most active prepration of it; which see.

Anodynes.—These are medicines that quiet pain. In the human, they procure sleep also; but no article with which we are acquainted is absolutely capable of producing this effect on the horse, whose stomach having but little secreting surface, on which most anodynes first act by a sympathetic effect, is not much open to this impression. As mitigators of pain, opium and hyoscyamus must be tried. Camphor and æther will also act as antispasmodics; but in all painful affections, where relief is essential, opium in doses of one, two, or three drachms, is chiefly to be depended on; and if pain be mitigated, sleep follows of course, from the fatigue of irritation.

Anthelmintics.—See Vermifuges.

Antimony.—There are several medicinal preparations made from the crude metal, as

Black sulphuret of antimony (Sulphuretum antimonii), the metal itself, but ground and levigated: in this state it is already compounded with sulphur, but when it is to be given as an alterative, more sulphur is often added to it, with nitre or other articles, according to the pleasure of the compounder: in doses of two, three, or as far as four drachms, it is a good and safe alterative, daily administered. It should be bought and powdered by the practitioner, or he may purchase manganese and forge-dust as a part of the mass. It holds within itself often a portion of arsenic, to which we attribute its occasional violence of action, particularly when given to dogs: the presence of arsenic may be tried by burning a little on a red hot iron plate, when a smell of garlic detects the arsenic.

Tartarized antimony (Antimonium tartarizatum). *Emetic tartar*, or the tartrate of potash and antimony, is a very valuable medicine in veterinary practice, although its merits are not allowed by some practitioners: but whoever will try it without prejudice, will have reason to be satisfied that it is both a febrifuge and expectorant (see Expectorants); and, as most of the fevers of horses are connected with some pneumonic affection, so a remedy that combines the properties of diminishing action, and increasing expectoration, is invaluable. In active pneumonia, I unite it with nitre, digitalis, and oxymel, in doses of one to two drachms, two or three times a-day. In lesser cases, it may be given with nitre and supertartrate of potash *(cream of tartar)* in similar doses, once a-day, in a mash. It is also an excellent alterative (see Alteratives). In full doses it occasions determination to the skin, and ultimately lessens the action of the heart and arteries: sometimes it increases the flow of urine. Mr. Morton notices it as an excellent emetic for dogs, in a dose of from one to three grains. Mr. Youatt does the same. It will also prove emetic, when applied externally, and in our opinion it certainly lessens the febrile action of the vascular system more effectually than any other medicament. Mr. Peall was also wont to use it as a vermifuge, and praised it highly. Hardly any quantity of tartarized antimony will kill a horse or ox: a dog cannot take ten grains without danger.

Antimonial powder (Pulvis antimonialis). This well known preparation, supposed to be the same with Dr. James's powder, is a compound of oxide of antimony with phosphate of lime. It has some febrifuge qualities; but although it determines to the skin and lessens arterial action; in my own practice I seldom found it so efficacious as the tartarized antimony. As an alterative it is useful in doses of one to two drachms; and as a promoter of condition it is often preferable to tartarized antimony.

Antimony, chloride of (Murias antimonii), or *butter* or *butyr of antimony*, is a very powerful escharotic. (See Escharotics.)

Antiseptics are remedies supposed to possess a power of resisting a putrefactive process in the body; but this disposition is questioned, and all medicines of this class are now considered as acting only by their stimulating qualities. —See Tonics and Stimulants.

Antispasmodics.—The horse is not subject to many spasmodic affections, and the class of remedies that applies to the few he is troubled with is small. Opium stands first on the list. Camphor, æther, hyoscyamus, belladonna, oil of turpentine, and asafœtida, have all of them likewise proved useful. Cold also, in an intense degree, is a powerful antispasmodic, for which reason we apply it in tetanus.

Aperients.—See Laxatives.

Arsenic, oxide (*Arsenicum oxydum*).—This powerful mineral is somewhat uncertain in its action, and not always safe either: were it not for this, it might be called a good tonic, in doses of ten grains to twenty daily, in a very fine powder: more has been given; but it sometimes appears to remain innocuous until the constitution is fully saturated with it; and then commences its noxious effects suddenly and irreparably: this destroys much of its usefulness, and makes it necessary to exhibit it with great caution: nor should it ever be given on an empty stomach. It has the power of staying the progress of glanders, and it ultimately cures farcy when watched and continued: it also appears to have some vermifuge properties; and it certainly retards the march of the rabid disease, but is not ultimately successful. The properties of this mineral are ably examined in *The Veterinarian*, vol. iii, where it will be seen (such are the anomalies of the action of caustic substances on the horse) that five drachms and a scruple were taken at once without injury. Externally, it assists other applications in the cure of mange.

Astringents.—These are supposed to act on the living fibres by producing increased contraction in them, in which point of view they form a very numerous and important class; but in a more limited sense, they are considered as substances that restrain immoderate fluxes, as of the intestines and kidneys. Those that act by constringing the divided ends of bloodvessels are called styptics. Opium, chalk, alum, starch, and catechu, act favourably in restraining intestinal fluxes. Catechu, alum, and acetate of lead, operate as astringents on the urinary passages.

Balls.—There are some circumstances, in the preparation of this form of medicines, not in general sufficiently attended to by veterinarians. Substances that are volatile do not keep well in balls, and therefore should only be made when used. The same caution is also requisite with such as liquefy by the absorption of air. All hard substances entering into balls should be finely powdered, and the moist matter that is to form them into an adhesive mass should be of a nature that will neither ferment nor become mouldy. Very dry and bulky powders are no way so conveniently formed into a mass, or keep so well, as by the addition of lard or palm oil. Such as are less bulky, and other matters, may be mixed with honey, syrup, or treacle, unless they are intended for keeping some months; in which case, if lard or palm oil be not used, well made conserve of roses forms a convenient medium: it is, however, the opinion of some, that saccharine media are less soluble in the stomach than vegetable and even animal oils. A mass of balls not intended for immediate use should be pressed down into a jar, and tied over with a bladder. As the *giving of a ball* is a forcible operation, so, when it is requisite to exhibit medicines more than once a-day, it is more prudent to give them in the form of drinks. A horse ball should not be so large as a pullet's egg, but rather longer; nor should it be too hard: the weight between an ounce and a half and two ounces. A very ingenious instrument is now made for giving balls, which may be used in every case, but is particularly applicable to colts, ponies, or horses with a small mouth. The common balling iron, used by persons not expert at *delivering* a ball, as it is termed, should always be guarded with cloth, to prevent the bars of the mouth from being wounded. *The most convenient mode of 'delivering a ball'* is, to back the horse in his stall, when the operator, raising himself on a stool (the bottom of the bucket is a very usual convenience, but it sometimes falls in, and alarms the horse), should gently draw the tongue a little out of the mouth, so as to prevent its rising to resist the passage of the hand; but it should not be laid hold of alone or the struggles of the horse may injure it, but should be held firmly by the fingers of the left hand against the jaw. The ball, being previously oiled, must now be taken between the tips of the fingers of the right hand, lengthwise, when the hand, being squeezed into as small a space as possible, should be passed up the mouth close to the roof, by which injury from the teeth will be avoided: having placed the ball on the root of the tongue, the hand may be withdrawn, and the tongue liberated, when the ball will pass down. The head should, during the whole, be but moderately elevated; when it is held too high, there is some danger of choking the horse.

BALSAMS are a kind of resinous juice, united with some of the extractive matter of the various plants they are obtained from, in combination with an essential oil. All the balsams are occasionally in use in veterinary medicine, and were formerly in very high estimation, for their supposed salutary action in chronic diseases of the lungs. They were also considered as a sovereign vulnerary for abraded urinary passages. It is the modern doctrine to think their efficacy overrated, and which is probably in some respects true, particularly as regards their expectorant qualities; nevertheless they are far from being inert: on the contrary, they appear to act very favourably in some instances, as a warm terebinthinated stimulant. There are balsams of Canada; of Copaiva; of Gilead; of Peru; and of Tolu. What is called balsam of sulphur is merely a compounded preparation of sulphur in oil.

BARBADOES TAR.—See TAR.

BARK.—Several of the *barks* enter into the veterinarian's list of medicaments, and all act by an astringent property on the animal fibre. Peruvian bark, which stands foremost in reputation, is almost excluded from our reach by its cost; and as horses are little subject to intermittents, so we can more readily dispense with it, particularly as the tonic qualities can be gained from others less expensive. I have used the willow, the elm, and the oak barks, particularly in conjunction with chamomile, in cases of debility after fever, with advantage. Cascarilla, canella, and Angustura barks prove themselves also valuable stomachic tonics. The elm and oak barks, in decoction, form excellent astringent washes for herpetic complaints, chapped heels, grease, &c. &c.

BARYTES (*Murias Barytæ*) has been tried with some benefit in glanders. It is, however, a very powerful medicament, and few glandered horses are able to bear the quantity requisite for the cure.—See GLANDERS.

BASILICON (*Ceratum resinæ*).—A useful digestive ointment.

BEANS, in a medical point of view, are sometimes used as a tonic, and the flour of them as a restringent.

BELLADONNA (*nightshade*).—Mr. Youatt considers this to have some prophylactic powers against rabies, but particularly when in union with the scutellaria, or skull-cap. He begins 'with a drachm ball to a moderate-sized dog, containing two scruples of the scutellaria, and about two and a half grains of the belladonna, to be given night and morning: on the second week two balls are given; on the third, three; and this continued for six weeks.' The nightshade is also a general sedative.

BLISTERS.—The *action* of blisters, and the cases in which they are properly applied, are detailed under the operations. The *substances* used for this purpose are various; the most important is the meloe cantharides, or Spanish fly, whose action is so certain and mild, that, as a simple vesicatory for internal inflammatory affections, every other article is very inferior. Euphorbium, which is the general substance introduced as a substitute for a portion of these flies, is sufficiently active; but it irritates, and therefore ought never to be employed in these cases. However, in common blistering for strains, &c., where the expense of cantharides is objected to, auxiliary vesicatories may be admitted, among which the tincture of croton is now used.

No. 1.—*Blister for general Use.*

Powdered cantharides	one pound
Venice turpentine	ditto
Resin	ditto
Palm oil, or lard	two pounds.

Melt the three latter articles slowly together, and, when not too hot, gradually mix the cantharides or flies.

No. 2.—*A powerful Blister.*

Powdered euphorbium	three ounces
Oil of vitriol	two drachms
Spanish flies	one pound
Palm oil, or lard	three pounds
Resin	three pounds
Oil of turpentine	eight ounces.

Melt the resin with the lard or palm oil, after which add the turpentine. Having previously mixed the oil of vitriol very gradually with an ounce of water, as gradually add these to the melted mass, which again set on a very slow fire for ten minutes more: afterwards remove the whole, and, when beginning to cool, add the powders previously mixed together.

No. 3.—*A Mercurial Blister for Splints, Spavins, and Ringbones, which may be used where dependence is placed on the action of Mercurials and Blisters, but which there is reason to think are but little assistant in the reduction of these exostoses, particularly if of long standing.*

Of either of the former	four ounces
Corrosive sublimate, powdered finely	half a drachm.

No. 4.—*Liquid Blister, strong; sometimes called* SWEATING BLISTER.

Spanish flies, in gross powder	half a pound
Oil of turpentine	two quarts
Olive oil	one quart.

Steep the flies in the turpentine three weeks; strain off, and add the olive oil.

No. 5.—*Liquid Blister, mild.*

Of the above	one pint
Olive oil	a pint and a half.

The farriers' *sweating blister* is only a strong stimulant, without actually separating the cuticle: it occasions heat and swelling, without excoriation or loss of hair; consequently it is a very convenient application, when it is an object to avoid a blemish, and when the case is not a very desperate one. But there are also instances in which it is to be preferred to an actual blister, as in recent strains, where some remains of heat and inflammation are present, but without activity: in such cases the sweating blister is very often efficacious. The mode of application is to rub it in of sufficient strength to irritate in a mild degree only, repeating it every day, until considerable swelling is occasioned, when the application should be desisted from, and the swelling suffered to subside.

No. 6.—*A Mustard Blister or Poultice, to be applied in cases of emergency, when blistering ointment is not at hand.*

Mix half a pound of flour of mustard into a paste, and apply hot. It may in some cases be strengthened by the addition of two ounces of oil of turpentine.

BLUE VITRIOL (*Cupri sulphas*).—See Sulphate of Copper.

BOLE ARMENIAN (*Bolus Armeniæ*), vulgarly called bole armenic, is an argillaceous earth impregnated with iron; and was formerly extolled for its astringent strengthening qualities, both externally and internally; but, although it has some claim to attention, it is seldom now used except in charges, and in some grease ointments.

BORAX.—See SODA.

BOX-TREE (*Buxus*).—This in a slight degree possesses preventive pr
against rabies or madness in animals, as my own experiments prove
Youatt, however, confides more in the belladonna and scutellaria; i
fortunately we yet want a specific.

BRAN. Independently of the use of this as an article of food, it may be
troduced as a medicine also, being mucilaginous and aperient. In th
point of view, it is perhaps the most certain laxative with which we
quainted, and at the same time the most mild also.—See MASHES.

BURGUNDY PITCH differs so little from resin in its qualities, as to need n
cular comment.—See RESIN.

BUTTER OR BUTYR OF ANTIMONY (*Antimonium Muriatum*).—See ESCHAR

CALAMINE, PREPARED (*Lapis calaminaris*), is an ore of zinc, which, when
to a fine powder, may be very usefully sprinkled on excoriations, and or
of the heels, to dry them. It is, however, most frequently used in the
the unguent called calamine cerate, and formerly Turner's cerate, and is
cellent desiccative application.

CALOMEL.—(See *Submuriate of Quicksilver*.)—This is a very useful med
horse practice, but is liable to some uncertainty in its action: there
cases in which its use is to be continued, it should only be given in d
fifteen to twenty grains daily, and even then should be carefully wa
for the moment the gums look red, the mouth feels hot, and a tende
observed in chewing, it should be immediately discontinued. Calom
not much effect as a vermifuge beyond its purgative properties: but
excellent alterative in skin affections, as hidebound, surfeits, &c.
proved useful also in farcy, grease, and œdema. I have used it succ
likewise in constitutional ophthalmia, both externally and internally.
often united with purges, but is not to be depended on alone as a pur
I prefer to give it in a mash on the evening preceding the morning the
is to be given, when the addition, in some cases, has an excellent effect.
drachms are a proper quantity for this purpose: but it must not be for
to subtract something from the strength of the morning purge. Duri
use of calomel as an alterative, the horse should not be exposed to
cold, nor should its use be persisted in more than a week without a
It remains to add, that, unless this article be purchased from a drug
reputation, it is very apt to be adulterated.

CAMPHOR is an Indian produce, chiefly extracted from the *laurus cam*
It is a substance whose action it is very difficult to define: but as it is
in its properties on the horse, it well deserves very full trial. In large
it produces convulsions and delirium: half an ounce has done this. I
derate doses, as a drachm, it proves sedative and antispasmodic, and
fore may be usefully employed in flatulent colic, in conjunction with
remedies. United with opium, it has acted beneficially in spasmodic
strictions of the neck of the bladder not dependent on inflammation.
also been highly spoken of as a powerful remedy in locked jaw: but tl
I have fully tried it in these cases, I am not able to say much in its fa
on very respectable authority it has been also warmly praised for its v
in fever: and as it is certainly possessed of that anomalous action bette
and observed than described, being at once a gentle stimulant and sootl
irritation in moderate repeated doses, so in the latter stages of febrile
plaints, where the debility and irritability are considerable, it may be
properly given. But in the more early stages its beneficial action is ques
able: nor are its powers sufficient as a permanent stimulant to be depe
on at any time without other auxiliaries. Externally it proves a mild
cutient in indurations and rheumatic affections; and I have also experie
advantage from its use in collyriums for inflamed eyes.

CANTHARIDES, or SPANISH FLIES.—These are, or ought to be, the prin
stimulating ingredient in the making of blisters; and every veterin
should purchase them whole and powder them himself, otherwise he wi
very apt to buy them adulterated. Previously to being powdered, they sh

be moderately dried, and then leisurely pounded, or rather ground into a powder, the operator guarding his face with a fine muslin handkerchief, so as not to receive the fine particles into his nose and throat, otherwise an unpleasant sense and soreness will arise. If they are very dry, and the powder flies much, add a few drops of sweet oil, which will prevent this. Of all the vesicating articles in use, none equal cantharides; they empty the subjacent vessels, and raise much local inflammation without at all injuring the texture of the cutis or its connexions; and without leaving any ulcerative process, as is the case with most other acrid applications, which, by so doing, keep up such a hurtful irritation at the close of fever and extensive inflammations as to preclude a favourable termination. They likewise make a very useful stimulating tincture for injecting into sinuous sores. Cantharides are found also to have a very salutary effect in those relaxations of mucous membranes which produce a morbid purulent secretion; and which is apparently done by stimulating the system generally, and these parts particularly, into a new and healthy action. It is thus they have been applied to the treatment of glanders, and with a prospect of limited success: in nasal gleets not directly glanderous, but whose continuance might tend to the disease, they have been extremely beneficial. Some experiments of M. Barthelemy's would also lead to a supposition that they do not exert an injurious effect on the kidneys by absorption when a blister is applied, as it has been long considered they do, and as we know that at least they occasionally do by the symptoms of strangury, which occur sometimes.

CAPSICUM.—In Indian horse practice, an infusion of Cayenne pepper is often given as a cure of flatulent colic, and as a vermifuge also; it is likewise used externally as a stimulant. I have myself tried it in colic with some advantage, but not with sufficient benefit to prefer it to the more established means. As a stomachic, it is decidedly inferior to the other spices.

CARAWAYS.—Both the seeds and essential oil are used as warm stomachic cordials.—See CORDIALS.

CARBON.—The chemical name of charcoal: it is useful in stopping the ulcerative process.—See POULTICES.

CARBONATE OF AMMONIA, or SALT OF HARTSHORN of the shops.—See AMMONIA.

CARBONATED WATER OF AMMONIA, or SPIRIT OF HARTSHORN.—See AMMONIA.

CARBONATE OF IRON.—See IRON.

CARROTS.—These become, under many circumstances, a medicine, as well as an article of diet. Even for the latter purpose they are not sufficiently known; for they fatten without heating, i. e. without promoting plethora; but, on the contrary, they keep the body cool by keeping it open, and greatly promote a healthy coat. As a *medicine* they often remove cough, cure incipient grease, are good in farcy, and beneficial in surfeits and mange; but in these latter cases they must be wholly substituted for corn. A *poultice* formed of the scraped root is an excellent application in cases of ichorous discharge from the heels.—See POULTICES.

CASTOR OIL (*Oleum Ricini*).—See OILS.

CATAPLASMS.—See CHARGES.

CATHARTICS.—Whatever excites the intestines to a more early, a more frequent, and a more copious discharge of their contents, may be termed a *cathartic*, or purge. If this effect be intended to be produced in a slight degree only, the article effecting it is termed a *laxative;* which see. The principal cathartic in veterinary practice is aloes. Castor oil, calomel, and neutral salts, may be considered as laxatives.—See PHYSICKING, ALOES, &c.

CATECHU.—By universal suffrage this has long been called *japan earth;* although it is an extract from a species of Indian acacia. It is a very mild but tolerably certain astringent; and its effects are, I think, even more certain on brutes than on the human subject. It acts favourably in relaxations of the urinary passages, and also in alvine fluxes or diarrhœa; in which latter cases it should be given with chalk, in doses of an ounce. It should not be united with any metallic salt, particularly in a diluted form, to avoid the affinity which its tannin or gallic acid, on which its astringent properties mainly depend, has for all metals, which union would reduce it to almost inertness. Even the chalk with which it is so commonly given, being an alkali, Mr. Youatt thinks weakens its action; but the loss is compensated, in his opinion, by its antacid properties. By an Indian practice, it would appear that catechu is a powerful sedative; for there it is given in daily doses of two ounces, for the purpose of taming vicious horses. As an astringent in the diarrhœa of cattle, it appears to be even more active than in the horse.

Caustics.—See Escharotics.

Cerates are ointments of a drying healing nature; the principal of which is calamine, or Turner's cerate.

Chalk, (*Creta*).—This is a carbonate of lime, commonly used in a prepared state under the name of *prepared chalk*. It is an excellent antacid and astringent, in diarrhœa, dependent on a vitiated state of the stomachic, biliary, and intestinal secretions: in this way it is that it proves so beneficial in the scouring of calves. The dose is from half an ounce to two ounces. It is occasionally sprinkled over cracks also. In the diarrhœa of dogs, which is so fatal a symptom of distemper, chalk and catechu are sheet anchors.

Chamomile.—If I do not very wrongly appreciate this vegetable, it unites in an admirable degree the qualities of a stomachic and febrifuge. In debility of the stomach and bowels it is a most excellent tonic, in doses of an ounce and a half once or twice a-day, particularly in conjunction with carbonate of iron. In fevers, but more especially in the debile stage of catarrh which succeeds the first inflammatory attack, and when the purulent discharge has appeared, it proves a most valuable assistant to the other medicines prescribed. In conjunction with acetated liquor of ammonia, it forms the best febrifuge for the secondary stages of fever in general with which we are acquainted.

Charcoal (*Charbo ligni*) has a peculiar property of amending the ichorous discharge from ill-conditioned ulcers, either sprinkled over them in powder or mixed with a poultice.

Charges are not much used by modern veterinarians; for a more extensive acquaintance with the animal economy teaches us that there is but little activity in what are considered as external bracers. Nevertheless, I think there are some other points of view in which we may place this matter, to prove that *charges* may yet prove of much service in some cases, if it be merely to act as a bandage, or to protect from cold. In this way a *charge* becomes a useful application to the loins in rheumatism; not only as it protects the affected part from cold, but also from the resin in it proving a useful stimulant. Windgalls, old lamenesses from ligamentary extension, &c., may be still further assisted after firing or blistering, by the continued bandage kept up by a *charge*. Any strong adhesive, as resin, pitch, &c., melted with wax or oil sufficient to keep it from being too brittle, may be formed into a *charge*, and applied warm on the part; and as it cools, it should be covered with flocks or short tow. The strengthening part of a charge was supposed to consist in adding armenian bole, crocus metallorum, litharge, or other matters; which may be still done if thought proper. Another favourite, and, if we believe the accounts given of it, a very effective *charge* in ligamentary lamenesses, was common salt with the white of egg.

Clysters.—These often form very important medicaments in veterinary practice, and have the valuable properties of being always safe, and commonly easy to give. From the length of time it requires to open the bowels by purgatives given by the mouth, clysters are often our principal dependence; and also when aperients cannot be given by the mouth, they become our only resource. Nutriment may likewise be given this way, when circumstances prevent its being received in the usual manner, or when it is requisite to throw a large quantity into the system. When clysters are given to remove costiveness, it is always proper to back-rake first (see Raking), as it removes any hardened dung that might obstruct the passage of the liquid. The apparatus made use of in giving a clyster may be a large hog's or ox's bladder, capable of holding five or six quarts, attached to a smooth wooden pipe an inch in diameter, and fourteen or sixteen inches long; but a much more efficient apparatus is *Reid's patent clyster syringe and stomach pump*, by which almost any quantity may be forced up to the required distance in the intestines. The liquor should not be too warm; but the pipe being oiled, the whole must be conducted gently, so that the horse may not be surprised with its being thrown up too suddenly. This is a better instrument for giving an injection than the pewter syringe made for this purpose by the veterinary instrument makers.

A laxative Clyster.

No. 1.—	Thin gruel, or broth	five quarts
	Epsom or common salt	six ounces
	Or in default of them, soft or yellow soap	two ounces.

A Clyster for Gripes.

No. 2.—Mash two moderately sized onions, over which pour oil of turpentine two ounces.

Thin gruel	four quarts.

A nourishing Clyster.

No. 3.—	Thick gruel	three quarts
	Strong ale	one quart.
Mix.—Or,		
	Strong broth	two quarts
	Thickened milk	two quarts.
Mix.		

Astringent Clysters.

No. 4.—	Tripe liquor, or suet boiled in milk	three pints
	Thin starch	two pints
	Laudanum	half an ounce.
No. 5.—	Alum whey	one quart
	Boiled starch	one quart.

Colchicum (*Meadow saffron root*) is a diuretic medicine to the horse, but as yet little known.

Collyriums are washes, commonly in use for the eyes.—See Washes.

Conserves.—These are numerous in the human pharmacy, though but few are used in horse practice. The conserve of red roses is, however, a most convenient medium for forming balls, as it is adhesive, and, when properly made, keeps well. It is, nevertheless, not intended by this to recommend it for horse balls in preference to palm oil, which is undoubtedly the best matter to form these balls; lard, next to it; but for small balls, particularly for dog balls, this conserve will be found very convenient.

Cordials are matters that invigorate by their stimulating property, usually through the medium of the stomach, but finally by being received into the circulation: thus oxygen gas, inhaled by the human into the lungs, produces a more vivid halo of imagination than ardent spirits. Cordials have been so long the very strong hold of the ignorant and presuming, and prove so injurious in the stable management of such persons, be they masters, farriers, or grooms, that the very term sounds ill in the ear of the well-informed veterinarian. The groom requires a cordial, because his daily and perhaps hourly habits tend to derange his stomach, which can only be brought to feel appetite when [illegible] by the [illegible] [illegible] first [illegible] [illegible]. But the horse [illegible] [illegible] [illegible] a cordial ball twice a week, or on every evening after hunting [illegible] his coat stares with the altered temperature [illegible] being unnatural, must be hurtful unless required by some very extra[illegible] exertion, which, by calling forth too much of the [illegible] has [illegible] expended the vital resources from whence the stomach draws its [illegible] office, and the appetite in consequence fails. Thus after a very hard [illegible] with hounds, after thirty, forty, or fifty miles rapid carrying or travel[illegible] this may happen, and then a gentle stimulant may excite the digestive [illegible] paths artificially until the natural powers return to it. Here a c[illegible] may be *proper* and even *necessary*, but how often does this necessity e[illegible] in proportion to the number of what are called cordial balls given, and g[illegible] unnecessarily, because not called for by the state and wants of the animal.—[illegible] forms of cordials see STIMULANTS.

COPPER (*Cuprum*) yields two articles used in veterinary practice.

Verdigris (*Ærugo*). Internally, the subacetate of copper has been g[illegible] in daily doses of two or three drachms, and sometimes with success; but does not appear, from what I have seen of it, to merit the exclusion of [illegible] appreciated remedies. It has, however, some power as a tonic, and in that point of view, may be properly administered. Externally, its benefits [illegible] more apparent, as it proves one of the best detergents and mild escharot[illegible] with which we are acquainted. Mixed with honey, it forms ægyptiac[illegible] and is used in ulcers of the mouth, and likewise as a paste to other ulcerat[illegible] parts. Mixed with tar, it becomes one of the best applications for thrush, grease, and cracks.

Blue Vitriol (Cupri sulphas).—This has been at one time lauded to t skies, at another abused to the shades; and, like most other matters th treated, its merits lie between the two. It is, unfortunately, not a cure f glanders; but it certainly does, in some cases, flatter much, and does som times not deceive. It has been justly observed of it, that in lingering chr nic cases, the result of catarrh, it proves a most excellent tonic; and he often it exerts its best influence, and puts a stop to the discharge which wo in the end contaminate the lungs. It is also a good detergent applicati in the proportion of half an ounce to a pint of water; or when sprinkl dry on unhealthy surfaces, as canker, &c., or injected into sinuous sores dilution.

CORIANDER. The seeds of the coriander are a warm aromatic stimulant.

CORROSIVE SUBLIMATE (*Hydrargyri oxymurias*).—See MERCURY.

COWHAGE. This has been described as a valuable vermifuge in doses of half drachm to a drachm; but it does not appear to me to possess much medicin activity.

CREAM OF TARTAR (*Potassæ supertartras*).—See POTASH.

CROTON TIGLII. In India this has long been used both as a human and bru purgative, and lately it has entered into the veterinary practice of this cou try: the expressed oil is of extraordinary power as a cathartic, but is seldo used, from its price, except in the human subject. In veterinary pharmacy tl meal, which possesses similar properties, is used: but, unfortunately, by tl arts of the druggist, it is often so adulterated as to deceive the expectatio of the practitioner. When it is pure, it may be given in doses from a scrup to half a drachm, with linseed meal, in the form of a ball, to shield its acri nature. It is equally, indeed, somewhat more, drastic than aloes, producir profuse liquid watery stools, and often much griping, and it occasionally tak as much time to excite purgation. It is also somewhat uncertain in its a tion, but, under a favourable operation, it is quicker than aloes, although o first accounts of it denied this. It may, therefore, when immediate purg tion is necessary, be very properly applied to; and also in tetanus its d minished bulk and great activity make it valuable. Dissolved in turpentin it forms a blister, but inferior to cantharides. For cattle, Mr. Morton ob serves, that its union with the sulphate of magnesia in doses of from twenty to thirty grains is now commonly had recourse to; and that it has been found effectual in overcoming obstinate constipations, as well as in those cases which require the bowels to be quickly acted upon.

Decoctions.—Many herbs are boiled to make decoctions of them. During the boiling, the vessel should be covered; and if the liquor be not intended for immediate use, it should afterwards be bottled, and have a small portion of some spirit added to it.

Demulcents are medicines that act mechanically, by surrounding acrid matter, and thus sheathing it from hurting sensible and irritable parts. In this way oily preparations act; likewise, honey, gums, mucilages, &c. Diluents, as warm fluids, mashes, &c., are also demulcents, because they dilute acrimonious matter, and render it less active.

Diapente was an old cordial, composed of gentian, bay berries, bithwort, ivory shavings, and myrrh. When made genuine, there are few better compounds as a stomachic cordial among those in present use.

Diaphoretics are supposed moderately to increase the natural exhalations of the skin. Sudorifics are intended to do it more actively, and to occasion actual sweating, which, in the horse, it proves very difficult to do; but a diaphoretic effect is more easy to excite. Vinegar will, however, often produce a violent perspiration, but it is not a salutary one; yet the same liquid, neutralized by ammoniacal salts into Mindererus's spirit, will often excite a favourable but mild diaphoretic effect. Antimonials in repeated doses, assisted by diluting liquors and warm clothing, will likewise commonly produce some diaphoresis. Camphor, in considerable doses, will also uniformly occasion determination to the skin. The principal diaphoretic is gained from such medicines as nauseate, as aloes, white hellebore, &c.

Digestives are stimulant applications that produce or increase the tendency to suppuration: they are mostly of the warm terebinthinated kind, or the gum resins. Of the former, are turpentine, resin, pitch, and tar: of the latter, are myrrh, aloes, balsams, &c.

Digitalis.—Foxglove, or, more properly *folks-glove*, or, as the Germans have it, *finger-hut*. Mr. Morton very justly forbids its use after it is a twelve-month old; and when it is considered how universally it is diffused, it is unpardonable to use it when its virtues are dried away. It has been most erroneously stated to be inert in veterinary practice, except in very large doses; and even then its salutary action was denied: but this opinion is losing ground. Mr. Youatt and myself have long stood its advocates, and we have lived to see it brought into more general use as a valuable sedative, and as an active agent in lessening irritability. In moderate *repeated* doses it very seldom fails to lessen arterial action, and excite mild diaphoresis. It is, however, somewhat irregular in its action, and appears to act best when the constitution is already excited. In some cases it commences its operations by increasing the pulse; but it almost invariably ends, when sufficiently continued (in doses of a drachm to a drachm and a half every four hours), in reducing it, and that in a particular manner: not altogether by diminishing the number of pulsations *regularly*, but by intermissions or lapses of pulsation between the beats; exactly after the manner which one would expect of this great pump of the machine, whose power seems thus occasionally altogether suspended, to give it time to recruit and then go on again. Thus, between every fifth and sixth, or sixth and seventh, or seventh and eighth beat, a momentary pause is detected, and then the systole and diastole follow each other in uniform tenses until a new interruption. The tyro is apt to be alarmed at this; but it is the effect the established practitioner expects and even wishes to produce: he has arrested the impetuosity of the circulation, and in general cases has cut short the disease. In all great visceral inflammations this happens with the use of digitalis; but it is in pneumonia it is more distinctly visible: it is, therefore, a most valuable agent, but, like all active agencies, requires much watching: without care it may be pushed too far, if, after the alteration of pulse just described, it is continued to be given in equal doses. The powder [illegible] should be diminished in strength and frequency, and instead of [illegible] and nitre as accompaniments, with which I have always [illegible] may be given with advantage [illegible]. If the [illegible] camphor and nitre, should altogether take place of the digitalis for [illegible] three or four days, when these [illegible] and nitre together. In this way [illegible] the white hellebore, and [illegible] very both valuable medicines [illegible]. But I [illegible] the subject. Mr Youatt recommends both a tincture and infusion of digitalis for ophthalmia, observing on it, that it is almost equal in power [illegible] and that it may also be advantageously alternated with that. The infusion is made by pouring a quart of boiling water on an ounce of the powder. The tincture, by digesting three ounces of it in a quart of spirit. Foxglove should be gathered about its flowering time, and dried in the dark, which greatly increases its strength. A French apothecary is said to have been able to obtain the active principle of digitalis, which he calls [illegible]. [illegible] and [illegible]. Mr Morton tells us digitalis appears [illegible] in combination with nitrate of potash and the [illegible] tartrate of antimony. In the dog we have also frequently administered it with [illegible] [illegible].

Discutients are remedies which dissolve impacted matter, as in enlargements formed by vascular deposits or extravasations.

Disinfectants have hitherto been little more than a name, or the process of decomposition of infection has been expensive, troublesome, and [illegible] in the extreme; but we have now a means, not only of completely disinfecting our houses and stables, but of removing the foetor of the most putrid substances instantaneously. The *chloride of lime* does this by the use of a concentrated solution, which is cheap, and which being mixed with ten times its quantity of water, and sprinkled around objects supposed to carry about them, or to throw off, the seeds of contagion, as in malignant epidemics, glanders, &c., completely removes all danger of infection. By washing the walls, standings, racks, mangers, head-stalls, brushes, curry-combs, &c. with this liquor, all risk is avoided, even where the most mangy horse has been placed.

Diuretics are such articles as stimulate the kidneys to a greater separation of urine from the blood; as resin, turpentine, oxymuriate of mercury, soda, nitre, &c.

Drinks, or **Drenches**, are the *liquid* remedies given to brutes. It is not so safe to give them by means of a bottle as by a horn, as instances have occurred of the neck of the bottle breaking. Mr. Bracy Clark recommends to reverse the drinking horn, closing up the large end, and forming a moderate opening at the smaller end, to introduce that into the mouth. In tetanus such a horn would be useful, and at all times it prevents the waste of the liquid; but in tetanus a patent syringe is a better means, and can be introduced by the sides of the teeth. The usual method of giving a drink is, I presume, familiar to most, but cannot well be practised without assistance. Insert the noose of a halter into the mouth, and by means of a stable-fork let the assistant raise the head higher than when giving a ball. The operator must now mount by a stool or a reversed pail, &c. &c., on the off side of the horse, and draw out the tongue with his left hand; with the right he should introduce the horn gently into the mouth, and completely over the root of the tongue, when, by overturning the horn, the whole of the drink will escape into the back part of the mouth: withdraw the horn, loosen the tongue, and at least the principal part of the fluid must be swallowed. It will be prudent, however, to still keep up the head some time longer, as many horses obstinately retain much of it in the mouth, and while so held it is common to give the muzzle an unexpected tap, which takes off the attention from the resistance, and the remainder is then swallowed. Much of the success of giving a drink depends on not filling the horn too full, at once introducing it thoroughly into the mouth, turning the drink quickly out of it, and as quickly loosening the tongue and withdrawing the horn. There have lately been some ingenious instruments brought forward for drenching; but we have not approved of any one so much as to recommend its adoption, in preference to the good old-fashioned *cow-horn*, when in practised hands.

Electricity is seldom used in veterinary practice with us. On the continent, powerful machines are found at the Veterinary Colleges of Paris and Berlin for the treatment of cataract, gutta serena, paralysis, &c.

Embrocations are external remedies applied by rubbing them on the part with the hand, a sponge, flannel, or brush, as occasion suits. The formulæ for them are very numerous, and it would extend beyond our limits to particularize them here; but, in the course of the work, frequent mention has been made of a *Saline Embrocation*, the recipe for which is as follows:—

Muriate of ammoniæ *(crude sal ammoniac)*	eight ounces
Vinegar	three pints.

Mix.

Emetic Tartar (*Antimonii tartarizatum*).—See Antimony.

Epsom Salts. (*Magnesiæ sulphas*).—See Sulphate of Magnesia. Glauber's salt possesses nearly similar properties, but is hardly so active, and much less convenient.

Escharotics, known among farriers by the more familiar term of caustics, are substances which destroy the texture of the parts they are applied to in the degree of their intensity, and therefore are often divided into *eroding* and *caustic*. Escharotic articles are numerous, but I shall notice such only as are particularly useful or popular. The *mineral acids* are active caustics. Sulphuric acid, or *oil of vitriol*, is sometimes mixed with blistering ointment and with other matters to hasten their stimulating effect. Nitrous acid (*aquafortis*) may be used in a similar way. The chloride or muriate of antimony, very commonly called by farriers the *butter of antimony*, is an escharotic or caustic in very general use in veterinary practice. Applied to a raw surface it instantly changes it white, destroying a thin layer of substance; hence it is a very convenient application in cankered feet, as, by means of a small camel's hair brush, it can be spread over as much or as little a portion of parts as is necessary. In sandcrack, when the sensible substance protrudes, it may be applied in a similar way. For the cure of corns, after the bruised portion has been removed, it likewise proves particularly useful. In obstinate cases of grease, the buds are sometimes beneficially touched with it: but in quittor, poll-evil, and other sinuses, it is not so proper as some other escharotics. —*Nitrated silver* (Argens nitras), or, as it is popularly called, *Lunar caustic*, is a preparation from silver, which renders it expensive: it is, however, essentially necessary to the veterinarian's dispensary, from its being so completely under command in its action, not extending its effects beyond the immediate part it is applied to. It proves the most convenient caustic for destroying the edges of a contaminated wound, when not too extensive, as the bite of a rabid animal. Dissolved in five, six, or eight times its own weight of water, it forms an excellent liquid caustic, peculiarly useful as a dressing for the foot rot in sheep, and also to touch the protruded portions in sandcrack. Dissolved in twenty times its weight of water, it makes a useful detergent wash for foul ulcers, and to keep down too luxuriant surfaces.—Caustic potash (*potassa fusa)*, called *lapis infernalis*, formed into a solid body, is also another powerful caustic, quicker in its action than the lunar, and therefore more convenient for extensive use; but its ready liquefaction renders it unfit for tedious operations or deep-seated parts. Made into a paste with soap, it forms a useful escharotic to insert into the pipes of a quittor.—Oxymuriate of mercury (*hydrargyri oxymurias)*, known by the term *corrosive sublimate*, is a very usual caustic employed, and is, perhaps, one of the best for '*coring out*' of quittors; it also enters into the formation of very active blisters. In strong solution it is an excellent application for grease, often curing when every oth- means have failed.—The nitrous oxyde of quicksilver, called *red precipit* is also another preparation from mercury, and in very general use as an escha- rotic in horse practice. Sprinkled over very foul surfaces, it changes the quickly into a better state; and it acts equally beneficially on luxuriant sor by destroying fungus, for which purpose its form of a powder render very convenient.—The sulphate of copper, called *blue vitriol*, is a much mil escharotic than some others, and much used to destroy fungus, both in pow and solution. A milder solution, of a drachm to six ounces of water, makes detergent lotion for ulcers, as grease, &c.—The sulphate of zinc, or *whi vitriol*, is also a good escharotic, and forms, in a saturate solution, the reme for quittor, which it is said has been adopted by Mr. Newport.—*Quick lime* sometimes used as an escharotic substance, for sprinkling over ulcerated su faces, as cankered feet, &c.; for which purpose it is convenient, from its pr- perty of absorbing the moisture.

EUPHORBIUM.—This most acrid substance is sometimes used as a substitute f cantharides. In blisters for general purposes, where the expense is an objec a portion of it may be admissible; but it irritates extremely, and theref should never be used when vesication is employed in fevers; and I would ev in all other cases advise the veterinarian rather to save in any other way tha out of the feelings of the animal whose welfare he is set as a guard over.— See BLISTERS.

EXPECTORANTS.—These are remedies that promote the removal of the irritati mucus formed in the bronchia and trachea, in affections of these parts. Th principal of these are tartar emetic, foxglove, Mindererus's spirit, oxymel, an probably squills: nauseants likewise act in this way. The critic might s that the horse does not expectorate; but his bronchial secretion can be in creased, and he can throw up and cough out the produce: thus this class remedies is not without its value in veterinary medicine.

EXTRACT OF LEAD.—See LEAD preparations.

FOMENTATIONS are warm fluid applications to an injured part, generally by mean of cloths wrung out of the hot liquor, and re-applied as it cools. Infusions various herbs have been employed for fomentations; but as the good effec is principally dependent on the warmth and moisture, so warm water alone generally sufficient. Fomentations allay irritation, and are useful as stimu lants to the flagging powers in gangrene: by tending to unload the vessel they also promote resolution in active inflammations; but they are seldom use sufficiently long, and attendants are very apt, when they are removed, to leav the part wet and uncovered, by which more harm is done frequently tha good, as the evaporation thus occasioned is a source of cold. As soon as a embrocation is removed, immediately wipe the part perfectly dry, and cover up from the external air. I have in some cases fomented, and immediately ap plied a poultice: as far as I know, the practice is singular, but it is more tha ordinarily beneficial.

GENTIAN is a useful stomachic bitter, and was much used in diapente: it has now somewhat given place to articles more in fashion; but I doubt much whethe more effective. Mr. Youatt considers gentian as a valuable animal tonic, s so much so, as to supersede most others. Its dose may vary by circumstance from one to three, four, or five drachms; but it should be always given with ginger.

GINGER is perhaps the best spice in the veterinary materia medica; but even this should not be wantonly used. As a warm cordial, it may be occasionally given is doses of two or three drachms; and in flatulent colic, in doses of four to six drachms: it will also form a valuable assistant to saline and other cold remedies, given to tender stomachs and bowels. For horses, for cattle, and sheep, it is an excellent carminative, and should be always employed when a warm stimulant is wanting. It is indeed one of the most valuable cordials to invigorate the stomachic and intestinal surfaces we know. The dose for cattle is from two to four drachms; and ʒss to ʒi for sheep.

Glauber's Salt (*Sodæ Sulphas*).—See **Epsom Salt.**

Glysters.—See **Clysters.**

Goulard's Extract,
Goulard's Wash, } See **Lead**, and Preparations of.

Grains of Paradise are warm spicy seeds, much in use among farriers, particularly for horned cattle; and are given by grooms to promote a fine coat. In this way they often do mischief; but as an addition to other stomachics, when necessary, they may be still properly made use of.

Gruel is an article of no small consequence in the veterinary materia medica, inasmuch as it is bland, mild, and diluting. In making it, care should be had to its intention: if as a cordial or for nutriment, it ought to be thick; if as a diluent, it cannot be too thin: it should likewise, when made, be perfectly clean, and free from smoke. Ignorant servants are apt to think any thing sufficiently clean for a brute, without being aware that the most delicate female is not half so susceptible to unpleasant sensations from dirt as is the horse; and if he once has gruel offered to him that has been smoked, it is only by force that he will ever after take any. A useful diluent is also made from bran, by pouring boiling water on it, when it is called *bran tea;* but it should be strained when cold, particularly when offered to horses in catarrh.

Gum.—This is a juice that flows from various trees and plants, and inspissates by heat. The gums in use in human pharmacy are numerous; but they are fewer in veterinary practice. *Gum arabic* and *Gum tragacanth* are both sometimes used in pectoral drinks, and other demulcent medicaments.

Gum Resins are compounded of gum and resin. *Gum ammoniacum* is sometimes used in chronic cough, but with doubtful advantage. *Gum guaiacum* is now very seldom used; *Gum dragon* has shared the same fate. *Gum myrrh* has outlived the reputation of the others; but it is questionable whether its virtue as a cordial, in the usual acceptation or meaning of the word, is not ideal; but as a permanent tonic it ranks higher.—See **Tonics.**

Hartshorn, Spirit of (*Aqua carbonatis ammoniæ*). See **Carbonate** of **Ammonia.**—Carbonated water, or spirit of ammonia, is convenient in veterinary practice, from its peculiar property of uniting oil and water. Internally, it is an antispasmodic in doses of eight to ten drachms. United with acetous acid, or vinegar, it forms an excellent diaphoretic febrifuge. And in conjunction with equal parts of oil, it forms the *volatile liniment*, which is a warm discutient application, much used for sore throat and indurated tumour.

Hellebore, white.—(*Veratrum album*). This active vegetable is variously estimated: Mr. Percivall cherishes its fame as a valuable sedative and active nauseant, given in doses of a scruple or half a drachm, every four, six, or eight hours. Mr. Youatt also praises it much for moderating active internal inflammation. We also have used it with very beneficial effects; but in verification of the old proverb, that doctors will differ, we are told that Mr. Sewell holds it in slight estimation; it has, however, crept into pretty general practice, and will have a run; some part of which celebrity it will retain, but probably not the whole of it. As the horse was not intended to vomit, so it is exceedingly difficult to excite nausea in him. Aloes have been used for that purpose, but they are uncertain, and in many cases cannot be prudently administered, from fear of drawing the neighbouring affections to the bowels. We are, therefore, forced to trust to the powdered root of the white hellebore, which is, perhaps, the most certain nauseant with which we are acquainted; but it is only safe under very watchful eyes and quick perceptions. It may be given to a certain point, and nothing but moderate nausea is observed: if pushed beyond this, the head droops in the manger, the mouth froths or slavers, the pulse sinks, the horse reels too and fro, and purging comes on, which commonly proves a fatal symptom. It may be given in doses of a scruple every six hours, and which may be increased to half a drachm; but the horse must be carefully looked to, and as soon as the pulse sinks and the mouth slavers, or any trembling appears, desist from its further exhibition, and directly combat its debilitating and sedative effects by active stimulants. The hellebore lowers the system more speedily than digitalis, but the digitalis more safely when there is time for its operation; at least so I have found: it is for the observant veterinarian to select the proper cases for both. It ranks high also with some veterinarians when used with setons by smearing them with the powder.

HELLEBORE, BLACK.—We understand that this root has lately been employed with much success as a local application in fistulous affections of the poll and withers. When the tumour has burst and been allowed to discharge two or three days, being dressed with an ordinary digestive, and the discharge being of the nature termed laudable; that then a few portions of the fibrous part of the root be passed to the bottom of the sinuses, allowing them to remain a fortnight or more. Under this treatment Mr. Morton assures us he has observed its salutary action in several cases. See Mr. M.'s *Veterinary Pharmacy*, 2d edition, p. 174.

HEMLOCK (*Cicuta*) is used as a sedative in pneumonic affections by some practitioners, in doses of two scruples to a drachm of the powder night and morning: but it is much inferior to either digitalis or hellebore.

HONEY is an article of importance in the veterinary pharmacopœia, not only as it is [illegible] usual medium for making balls with, as well as ægyptiacums; but also as it forms, in conjunction with vinegar, the simple oxymel, an article that should always be at hand, and which should never be made with sugar for cheapness; as there is little doubt but that the honey is in itself a demulcent and balsam of much virtue And provided the veterinarian orders from his druggist the foreign honey, and watches his time for purchasing it, it may be obtained for 6*d*., 7*d*., or 8*d*. per pound. But this kind will be found too thin to form balls with; and, indeed, honey is so apt to ferment, that it should never be used in this way, but when the mass is intended for immediate use.

HYOSCYAMUS (*Henbane*) appears to act as a sedative, without the constipating qualities of opium.

INSTRUMENTS.—Veterinarians are not sufficiently careful relative to their instruments, which should be kept in the best order, and always ready for immediate use. The lancets, fleams, &c. purchased at cutlers, are too apt to be procured wholesale from Sheffield or Birmingham, where the tempering is not sufficiently attended to. But the veterinarian who is curious in this respect, will do well to furnish himself from the successor to the late Mr. Long, of Holborn, who is, I believe, one of the best veterinary instrument makers in England. Here may be seen all the improvements that have taken place either from the suggestions of the various practitioners in this art, or from the ingenuity of Mr. Long himself, whose attention to this useful branch of the arts is still acknowledged by his successors.

INFUSIONS are only different from decoctions by the articles employed being *steeped* together instead of boiled.

IODINE.—Among horses this substance has not long made its appearance; but as a remedy for bronchocele it has been some years employed on dogs. It is now given to horses to promote a solution of the glandular swellings which frequently remain after catarrh. In daily doses of five grains it seems to have much resolving power, not over these only, but also over all other glandular enlargements. It appears also to possess tonic and alterative properties combined. Its purity may be tested by its becoming soluble in alcohol, and by evaporating entirely by heat. In Mr. Morton's *Manual of Pharmacy*, several preparations of it are given, with valuable notices thereon, which we recommend to consideration. It is by some veterinarians very highly thought of; we particularly allude to the *iodine of potassium*, which may be administered to the horse from twenty to thirty grains: to cattle it may be given from five to ten grains. An ointment, *ung. potassi iodidi*, is also an active dispeller of glandular enlargements. Its effects, we may add, are often slow, but seldom unavailing.

IRON.—Almost all the preparations from this metal prove excellent tonics to the horse. Iron filings (*limatura ferri*) may be given in the corn or a mash, in doses of two or three ounces once or twice a-day. The rust, or carbonate (*ferri carbonas*), is another form, and proves useful when given as the former, in doses of one ounce to two. Green vitriol, or copperas as it is called (*ferri sulphas*), is also given as a tonic, and some think it a preferable preparation, on account of its saline admixture. It is usually given in a daily dose of four to six drachms: it has more lately been given with some success in that form of glanders which has been termed the insidious. All the preparations of iron appear to produce most effect when combined with aromatic bitters: they should not be united with any alkali, consequently ought not, in chemical strictness, to be made up with soap; nor should nitre or any astringent vegetable enter the composition with them: though, for the reasons noticed in the introduction to the pharmacy, a mechanical *holding together* in a ball is very different from an intimate mixture in dilute solution.

JALAP, though so strong a human purgative, is totally inactive in the horse.

JAPAN EARTH.—See CATECHU.

JUNIPER.—The berries are now and then given, but more frequently the essential oil is used as a warm stomachic and slight diuretic.

KALI.—See POTASH.

LARD.—Many practitioners are at a loss for a substitute for lard, which forms the basis of most of their unctuous matters. When, however, lard cannot be procured, or is extravagantly dear, the fatty matter, called *palm oil*, which is of the same consistence, may be always obtained, commonly at less than a shilling a pound: as a medium for balls, it may, as a vegetable oil, be supposed much less disgusting to the stomach of the horse than an animal oil, as lard.

LAUDANUM.—The liquid preparation or tincture of opium.—See OPIUM.

LAXATIVES may be denominated milder purgatives, and, as acting with less irritation, are much to be preferred to them in violent inflammatory affections. In some chronic cases, also, they are eligible, because they can be more frequently repeated. Of this latter kind are calomel with small doses of aloes. The laxatives proper in febrile cases are Epsom, Glauber's, or, in default of these, common salt, eight to twelve ounces, dissolved in thin gruel, and repeated every six or eight hours till effect is produced. In some cases, as bowel affections, from six to eight or ten ounces of castor or linseed oil, with a few ounces of watery tincture of aloes, form the best laxative. It must, however, be allowed, that most of these articles are uncertain in their action; but their uncertainty is by no means equal to that which it is the fashion of the present day to represent, as the experiments detailed, in which there is much discrepancy, shew. The action of laxatives is much assisted by diluting drinks, bran mashes, raking, and clysters: indeed, both bran mashes and clysters are of themselves in many cases sufficiently laxative. Grass, particularly that of the salt marshes, forms also an excellent laxative out of the stable, as soiling does in it.

LEAD.—Several preparations of this metal enter into veterinary practice. The principal of these is the

Lead, Acetate of (*Superacetas plumbi*).—In the former dispensatory, this was called the acetate of lead; but it is still familiarly known by the old term of *sugar of lead* among farriers; originally so called from its sweet taste. It is of much importance in veterinary practice, forming a more convenient, and I think a more efficacious, mode of making *Goulard water*, as the solution of it is popularly called; but which liquor has been usually made from a preparation of litharge, called extract of saturn, or Goulard's extract. When this celebrated liquor is made from the dry acetate, do it as follows:

Goulard water.—Take acetate of lead, one drachm to two, proof spirit an ounce, soft water a pint: when the extract is preferred, it is thus made:—Liquid acetate of lead, extract of saturn (*liquor plumbi acetatis*), one drachm to two; proof spirit an ounce; soft water a pint. Either of these preparations of the acetate of lead are excellent, and justly appreciated applications, in superficial inflammations; but, to produce the full effect, the part affected should be kept constantly wet with one or the other of them. Internally, this preparation is inert: even four ounces have been given without producing any visible effect.

Lead, Carbonate of (*Plumbi carbonas*).—White lead is sometimes used as a desiccative, being sprinkled over a sore.

Lead, Litharge of (*Plumbi oxydum semivitreum*).—From this the celebrated extract of Goulard is made, which, infused in water, produces the Goulard wash, but which I prefer to make of the superacetate or sugar of lead, as it is erroneously called.

LIME is, in some cases, when *quick*, a useful caustic; and, when pulverized, is found good to sprinkle over cankered feet, greasy heels, or any foul surface, where an absorption of moisture, as well as an escharotic process, are desirable.

Lime Water.—Six pounds of lime, infused in two gallons of water, may, after standing three or four hours, be strained off, and kept in a *closely stopped* bottle for use, without which care it will be useless. Lime water is a good application for mange, and is also sometimes recommended internally for obstinate coughs and nephritic complaints.

Chloride of Lime is a most valuable disinfector: it is also used as an external application to wounds having a putrid tendency; in the latter use it is inferior to the chloride of soda, which see. In a retention of the placenta, called *not having cleansed*, in a cow, where the putridity had become so great as to produce larvæ or maggots and intolerable fœtor, there was injected a wine-glass of *chloride of lime*, diluted with a pint of warm water, into the vagina, which itself brought away, in two hours' time, several quarts of putrid matter, by which the cow was greatly relieved; but some fœtor returning, a second injection was passed the next day, which again sweetened the cleansing, and prevented further putrefaction. But as the placenta was not yet ejected, two ounces of the chloride of *soda* was now given in a pint of gruel every hour: the consequence of which was, that after the sixth dose the placenta came away, much decomposed, but without fœtor; and the cow was evidently saved by these means, though apparently before in a dying condition.

LINIMENT is a fluid preparation of oil and other matters.

LINSEED.—The seeds boiled form a thick mucilaginous demulcent drink, used in catarrh, sore throat, and all chest affections. *Linseed powder* makes a convenient poultice, particularly where a close application of the poulticing medium is required.

LIQUID BLISTER.—See **BLISTER**; see, also, *Sweating Blister.*

LIQUOR AMMONIÆ ACETATIS.—See *Acetated Liquor of Ammonia.*

LIQUORICE, like linseed, entered into the composition of numerous old recipes, but, in this way the virtues of neither, particularly of the latter, are very conspicuous.

LOTIONS.—See **WASHES.**

MADDER.—Much dependence used to be placed on the virtues of this, among old farriers, in diseases of the stomach and liver, as well as in farcy. It was also considered as a preventive against the effects of venemous bites. In farcy I have witnessed some good from it, but not enough to deserve particular attention: in other respects, I believe it does not merit much notice.

MALT.—This forms an excellent cordial in cases of debility, and, when continued, it becomes a permanent tonic: it has also some pectoral qualities; but in active inflammations of the chest it is too stimulant. Malt is also an excellent alterative: in farcy, in grease, and in mange also, when accompanied with emaciation, I have used it with extreme efficacy: but, in such cases, it should be given in considerable quantities without other corn, and even with as little hay as possible, so that almost all the nutriment received by the constitution may be by the malt. This practice is not generally known, but it has proved with me, in some cases, singularly efficacious: the best mode of giving malt is by mashes.—See **MASHES.**

MARSHMALLOWS.—Either the leaves, stalks, or roots, when boiled, yield a mucilaginous liquor, formerly much used as a fomentation, and occasionally given internally as a demulcent; but this plant has fallen into disuse among us, though still in repute on the continent.

Mashes are much in request in stable management, and are made from oats, barley, bran, malt, linseed, and sometimes chaff: they are also given cold or warm; but, in either case, should always be hot when made. In making them, care is necessary to avoid smoking the water, and not to stir them with any thing dirty, or the horse, being a cleanly animal, will refuse them. The mode of mashing is sufficiently known: boiling water being poured on the bran, corn, or whatever is the subject of the mash, to the consistence, when stirred, of a poultice, it should be covered over, and suffered to remain an hour or two, unless it is to be given hot to steam the head, as in catarrh; but even here it should not be hung round the neck immediately, or it would alarm the horse. Some horses will not readily eat bran mashes without a handful of corn to make it palatable: when horses are weakly and much emaciated, it is prudent often to mash all their corn. The quantity intended for them the ensuing day may be put into a vessel the over-night, and boiling water poured on it: in this way it is rendered more easy of digestion, and hence more nutritive. *Speared corn* has been sometimes recommended in the course of the Work; which is nothing more than malting a quantity, by putting cold water to it for twenty-four hours, and then spreading it on a floor two inches thick, which will soon make it sprout, when it may be given. In this way, it must be made from day to day, or it will become musty or mouldy.

Mercury (*Hydrargyrus*), or Quicksilver.—This singular mineral yields us some of our most active medicinal agents.

Corrosive mercury (*Hydrargyrus oxymurias*), popularly called corrosive sublimate, forms an excellent medical agent in judicious hands. As an alterative, it may be given in doses of ten to twenty grains daily: in glanders and farcy this quantity may be gradually increased to as much as the horse will bear without inconvenience; but as its noxious effects are often sudden, so it must be most carefully watched. It proves also a very certain diuretic in large doses (see Diuretics). *Externally*, also, its effects are considerable. As a caustic, it has already been noticed among *Escharotics*. It forms a useful wash for mange, and is an excellent auxiliary to the stimulant properties of blisters, when used for exostosis. It appears to have a very peculiar effect on cattle: received by the stomach, a considerable quantity may be given with impunity: but sprinkled on a wound, comparatively a small quantity destroys. See some very instructive notices with regard to this active medicament, in Mr. Morton's *Manual of Pharmacy*, second edition, p. 189.

Red precipitated mercury (*Hydrargyri oxydum rubrum*), or *red precipitate*, is a useful, active, and convenient caustic, by the ease with which it may be sprinkled over sores. (See Escharotics).

Black sulphuret of mercury (*Hydrargyri sulphuretum nigrum*), or *Æthiops Mineral*, is less frequently given in horse practice than it deserves. There is too much fashion in our pharmacy, and too little experiment. In all skin affections I have found this a valuable alterative, and also vermifuge, in daily doses of two or three drachms. It is equally useful in the mange of dogs. See '*Canine Pathology*.'

Mint and Peppermint.—See Oils.

Muriate of Antimony.—See Antimony.

Muriate of Barytes.—See Barytes.

Muriate of Soda, or Common Salt.—See Salts.

Myrrh.—This excellent gum resin is a valuable tonic to the horse, in doses of an ounce, particularly if united with salt of steel, and any warm bitter. There are two tinctures of it; one simple, and one compounded with aloes: both of which are much used externally, as warm digestives, in wounds and sinuous sores, where the application is attended with striking benefit frequently: the aloetic tincture is by much the most stimulant. To cattle also it proves a stimulating tonic and valuable antiseptic in doses of from ʒij to ʒiv.

Naphtha.—See Tar.

Narcotics are not altogether similar in their action to antispasmodics, but more so to anodynes; yet the analogy altogether is so considerable, that, in the present instance, it is not necessary to separate the consideration of them from what lessens irritation and eases pain.—See Antispasmodics and Anodynes.

Natron.—See Soda.

Nitrate of Silver (*Argenti nitras*). This is popularly called *lunar caustic*, and is in veterinary practice a valuable external application: to the human subject, and to dogs, it is also a good internal one in nervous affections.—See Escharotics.

Nitre (*Potassæ nitras*) is a very general mineral product, and is as useful as it is general: it is compounded of nitric acid, and vegetable alkali, whence its chemical name *nitrate of potash*. It is the most powerful refrigerant we know: it greatly diminishes febrile action, and determines its depleting action more certainly to the kidneys than any of the saline articles we use. It is also antiseptic and diaphoretic, and therefore of great consequence in active fever, given two or three times a-day in doses of three or four drachms. As an alterative it is also well known; but it is not a good plan, as practised by some grooms, to infuse it into the water which horses are to drink; it is apt to disgust them from all drinking. Nitre is sometimes used as a cooling lotion for inflammatory swellings arising from sprains.

Nitre, Sweet Spirit of (*Spiritus ætheris nitrici*).—This is a valuable preparation of nitre, inasmuch as it is a refrigerant, and yet, in some measure, a cordial, from its ætherial composition; therefore it is a useful medicine in the more advanced stages of fever, in does of an ounce two or three times a-day. It is also a useful article to give in the immediate approach of the first cold fit of fever, in a dose of two ounces.—See Fever.

Nitrous Acid (*Acidum nitrosum dilutum*), or *aquafortis*.—See Caustics.

Oak Bark.—See Barks.

Oils.—These are either fixed or volatile. The *fixed oils* are so called because they are not liable to be changed into vapour but under a high degree of temperature, and are also generally gained in quantities by expression. The *volatile oils*, on the contrary, are produced by distillation, and evaporate by a moderate heat. The fixed kind, in horse practice, are,—

Oil of Bay, an expressed oil from bay berries: now obsolete, except in the recipes of the country smith.

Oil of Castor.—See Castor Oil.—In very large doses this occasions some disturbance in the bowels, and does not often operate as a laxative; but in doses of eight or ten ounces, repeated every five or six hours, it proves frequently an excellent laxative when more drastic matters are inadmissible. It is apt to be decried, and numerous experiments are detailed to prove that it is noxious as well as inert, but hardly any two experiments agree. I have given it for years, without experiencing any ill effect, but often the best, from its use. It is true, it can never gain a character as a certain aperient; it is, on the contrary, an uncertain one, unless joined with a watery tincture of aloes, or with neutral salts, when the mixture seldom fails, if mashes have been in use: alone, it must be owned, it is not always certain as a purgative, but in quantities that produce much irritation. It is a most safe and invaluable purgative to the dog.

Oil of Olives.—The best olive oil may be substituted for castor oil, when the latter cannot be obtained. It is the principal medium in the composition of liniments, and enters into many ointments.

Oil of Linseed.—This is considered as a pectoral by the older farriers, and was formerly much used in coughs, but is now seldom given. It is also a pretty certain laxative, and is more to be depended on than olive oil; and in many instances more than castor oil.

Oil of Palm.—Country practitioners hardly know there is such an article as this, which has the consistence of all the other properties of lard, with the addition of a most fragrant smell. In quantities it may be also purchased cheaper than lard, and, as it does not become rancid, it is greatly to be preferred: it must also be less noxious to the stomach of the horse than the animal oil of the swine. It is the produce of the kernels of the fruit of the Cocos Butyracea, or Mackaw tree, or Brazilian palm.

The *essential* or *volatile* oils are,—

Oil of Amber.—An antispasmodic not much in use. It is said to have a peculiar property of hastening the action of aloes.

Oil of Anise Seeds.—This is an elegant warm aromatic, and may very properly be added to cordial balls, in doses of ten to thirty drops.

Oil of Caraways may be used in the same way, and considered in a similar point of view.

Oil of Juniper.—This is often added to diuretic balls, to increase their effect: it acts, however, principally, as a warm aromatic.

Oil of Petre is only Barbadoes tar in oil of turpentine.

Oil of Tar is a cheap penetrating distillation from tar, that may be substituted for turpentine: but it may be better employed in mixture with whale-oil, as a suppleing matter for the hoofs.

Oil of Turpentine.—See TURPENTINE.

Oil of Origanum.—This warm penetrating oil was formerly much used among farriers as an external stimulant; but it possesses no powers superior to turpentine, and is therefore little used by modern practitioners.

Oil of Spike.—To this, also, the older farriers attributed superior efficacy, although it was nothing more than oil of turpentine coloured with alkanet root.

Oil of Vitriol.—See SULPHURIC ACID.

OINTMENTS are greasy applications for covering excoriated surfaces. The numerous preparations of this kind are much reduced in number; for, although some certainly have a salutary influence on a wound, yet, after all, their principal merit is in the defence they afford.

ONIONS.—In domestic practice the juice of three or four onions in half a pint of sound ale or gin has relieved flatulent colic. The French, in such cases, introduce a large one up the anus.

OPIUM.—I believe it has been attempted to prove that this valuable antispasmodic is nearly inert in the horse, and it is true that it requires a large dose to exert a narcotic effect; on the contrary, its action is rather that of a stimulant when the system is already excited; it therefore is injurious in direct increased vascular action; but in indirect vascular action, the consequence of some great irritation, it then exerts its sedative properties. In enteritis of the horse, nevertheless, after blood has been abstracted, it has had a most salutary effect. See ENTERITIS. This is apparent in tetanus, where its benefits are sometimes most striking: in spasmodic colic its benefits are particularly observable in doses of two to three drachms; in which cases, also, it may be given in clysters as well. It greatly assists the action of astringents in diarrhœa; and, in profuse staling, united with alum and catechu, it has proved singularly efficacious; as also in difficult staling, not dependent on inflammation In farcy and skin complaints, it combats the ill effects of too large doses of active minerals. It increases the pulse, in repeated doses of one to two drachms every six hours; hence it is an useful auxiliary remedy in the debile stages of irritative fever. As a direct narcotic, opium is not active on most brutes: the dog will take sixty grains without sensible effect: the sheep may have three drachms in infusion passed into the true stomach without proving narcotic.

Laudanum is the tincture of opium, but it is too diffused for much use in horse practice, unless when a very small dose is required. A watery solution may, however, be made strong, and the whole given; that is, sediment and all.

OXALIC ACID, in the hands of Dr. M'Donald, has been successfully employed in the preservation of the colours of anatomical preparations, when exhibited in the humid way: it must be very evident that such a discovery must greatly and these preparations, whether we consider them as objects of admiration, or of study. See *Veterinarian*, vol. ii, p. 38.

Oxymel, Simple.—This is made by simmering a pint of vinegar with two pounds of honey. Sugar is sometimes substituted, but this is never advisable, as it destroys, I am disposed to think, a considerable portion of the efficacy of the compound. Oxymel, properly made, will be found a valuable remedy in pneumonia, and all catarrhal affections; particularly in conjunction with nitre, tartar emetic, and foxglove; the dose from four to six ounces.

Palm Oil.—See Oils.

Peppers.—The various kinds of peppers are sometimes used by farriers, particularly in colic. Mr. B. Clark has written a treatise expressly on the virtue of the pimento berry (see Colic). As a domestic remedy, either of them may be very properly given in doses of three drachms to six; except the Cayenne, which, as being very strong, admits of only a drachm as a dose: the peppers are sometimes used as a stomachic, or to warm other more permanent tonics, as steel, bitters, &c.

Physic.—See Cathartics.

Pitch is used to give a consistence and adhesiveness to plaisters and ointments, and is also the basis of charges. It has as much *medicinal* quality as its relationship with terebinthinated substances allows it.

Potash (*Potassa*) has been commonly called the *vegetable alkali*, to distinguish it from soda, or the *mineral alkali*. Potash forms two principal compounds, the *nitrate* and the *supertartrate*: the former has been noticed as nitre; the other is cream of tartar, as popularly called.

Supertartrate of Potash (Potassæ supertartras, *cream of tartar*).—This is not a very active medicament in horse practice, but is however slightly febrifuge, and mildly diuretic: it has some alterative powers therefore, and unites very well with those alteratives we employ when horses are labouring under cutaneous affections.

Poultices.—In veterinary practice, bread would be too expensive an article to make poultices of in common cases. Bran, therefore, is very commonly used; and, to give it a proper consistence, some linseed meal, if thought necessary, may be mixed with it; or, in default of this, a little of any other meal. A *poultice* should be made of a sufficient consistence, that it may not run through the cloth it is put in; and yet it should not be so thick as to dry too quickly, for a poultice acts principally by its moisture; therefore it should be frequently wetted through the cloth with the predominating fluid, of whatever kind. In applying poultices to the legs, care should be taken not to tie them too tight, as is frequently done, and thereby the mischief aggravated instead of relieved: a piece of broad list is, for this reason, very proper to fasten them on with. A poultice should never be applied too hot; very little good can be derived from it, and much pain may be occasioned. A hot poultice soon comes to the heat of the part; and as in most cases requiring one the part, at the moment of application, is in a state of comparative debility, too great heat only farther weakens it. Poultices are likewise, in many cases, applied cold, as in some strains, and in affections of the eye. A very convenient mode of applying a poultice to the extremities is by means of an old worsted stocking cut off at the ancle. The leg of it being slipped over the hoof, is brought around the part, and secured below by means of broad list not too tightly applied. The poultice is then put into the stocking by means of the hand, and afterwards secured above by another piece of broad tape loosely applied; after which the top of the stocking may be folded down over it. In cases where it is found difficult to keep a poultice on any part of the extremities, from its inclination to slip down, still by no means tighten the supporting bandage; but, instead, pass a long tape from it over the withers, or back, if behind, and attach it to the other side of the bandage; it will then be effectually secured from slipping.

A common softening Poultice.

Bran, any quantity; pour on it boiling water, to form a thin paste; add linseed meal sufficient to make it adhesive. After this, stir in one or two ounces of sweet oil.

A cooling Poultice.

Bran, any quantity; pour on it a sufficient quantity of cold Goulard water to form a poultice; which, as it dries, moisten with more Goulard water.

Cleansing Poultices for Grease, or ichorous Discharges from other diseased Surfaces, or for gangrenous Wounds.

Oatmeal	half a pint
Linseed meal	ditto
Powdered charcoal	four ounces

Stale beer grounds, sufficient to make a poultice.

Or,

Carrots, scraped, sufficient to make a poultice.

Or,

Turnips, boiled and mashed, sufficient to make a poultice.

To either of these four ounces of powdered charcoal may be added, if thought proper. Or,

Linseed meal, or oatmeal flour, any quantity; mix with boiling water, and ferment with a table-spoonful of yeast: as it rises, apply to the part.

In cases of extensive gangrene, an ounce or two of oil of turpentine may be added to either of these poultices.

POWDERS.—Pulverized medicines, without much taste, may be conveniently given by mixing with a mash, or in the corn. If in the latter, and the matters given are very dry and light, the corn should be first sprinkled with water, to prevent the powder being blown away by the horse breathing or snorting. But whenever a horse is delicate in his stomach, and refuses his food on this account, the attempt to give them thus should not be persisted in.

PURGES.—See CATHARTICS.

QUASSIA, a useful bitter in doses of six to ten drachms.

QUINA, often called *quinine*, is a disulphate of quina, and, as far as our own experience goes, is a very valuable brute as well as human tonic in doses from ʒss to ʒj, and is more particularly so if conjoined with camphor. We need not say that its costliness prevents its use but in particular cases.

RAKING is a method of emptying the bowels by means of the hand. The right-hand arm being stripped and oiled, with the left hand the tail is drawn aside, when the right being made as small as possible, and cone like, should be gently introduced up the fundament, and any quantity of hardened excrement the hand meets with carefully removed in small pieces. From this it will be at once evident that *back raking* must be useful in a vast variety of cases. It should always be made use of previously to giving a clyster, otherwise the hardened matter may prevent the passage of the fluid. It is also always proper in colic; and in all cases of costiveness it should never be dispensed with.

RED PRECIPITATE.—See MERCURY.

REPELLENTS.—Medicines whose action was supposed to consist in driving back humours from one part to another. Modern physiology allows no such action; and it appears, from the theories now received, that all repellents, as they were termed, act simply by their tonic power.

RESIN, commonly called rosin, is either yellow or black. The yellow is the one used in veterinary practice; internally as a diuretic; and, externally, in charges, plaisters, &c.

RUE, joined with box, has been thought to be an antidote to the effects of the bite of a rabid dog. I have myself witnessed the preventive powers mixture in which it was an ingredient: but I am disposed to attribute principal efficacy to the box (see RABIES). As a remedy in farcy, wa and grease, in all which it was formerly used, it has little virtue.

SALINE EMBROCATIONS.—See EMBROCATIONS.

SALTS are divided into acids, alkalies, and neutrals.

Common Salt. This is a useful remedy in veterinary practice: for w Epsom or Glauber's salt cannot be conveniently got at, this may be sub tuted as an aperient. It also proves itself a vermifuge, and in solution as the effects of opening clysters. It may be given in doses of from six to ounces. In the proportion of a drachm to six ounces of water, it has b found an excellent collyrium for ophthalmia when the first inflammatory tation has subsided. The *chloride of sodium* or common salt is an inval tonic and alterative, and is so palatable that it induces the animals it is before, when mixed with their provender, to eat it with avidity. It incre the digestive powers; and we believe it to be a vermifuge also. As a re for the rot in sheep, Mr. Youatt bears evidence of its excellence.

Salt, Epsom (Magnesia sulphas).—See SULPHATE OF MAGNESIA.

Salt of Steel. See IRON.

Salt of Tartar. See POTASH.

SAVIN. This was formerly strongly recommended as a powerful vermifuge have sometimes seen worms come away when it has been given, particul by considerable doses of the essential oil, as five or six drachms; but I sider it altogether as less efficacious than those vermifuges already notic made into an ointment, however, it is efficacious against warts.

SCUTELLARIA (*Skull-cap*). This herb has obtained some celebrity for its s posed efficacy in stemming the ravages of rabies, and as a *prophylactic*: experiments of Mr. Youatt go to establish its claim, particularly in union belladonna, which see.

SEA WATER.—For the same purposes that common salt is given, sea water also be employed in doses of two or three pints. Some horses will drin of themselves; and persons living on the sea coast affirm, that it is not common for a horse out of condition to break away and go to the sea sid drink, as though impressed with an instinctive knowledge of the efficacy as an alterative or vermifuge. It is remarkable, however, that horses on sea coast seldom carry a fine coat, which can only arise from the action of sea air externally applied, for internally they are usually healthy.

SEDATIVES. These form a class of valuable remedies calculated to dimi the irritability of the system, either by acting on the immediate part or the whole sensorium through the medium of the stomach, usually. In s cases they may be supposed to act by bringing up the system to a stat resist the irritating impressions; in others they lower the animal powers a lessened sensibility by a narcotic or soporific effect. In the horse we h no remedies that are decided soporifics; but we have such as lessen irrita and check spasmodic action (see ANTISPASMODICS). Opium, hyoscyamu henbane, digitalis or foxglove, cicuta or hemlock, belladonna or nightsh camphor, nauseants, the cold bath, are sedatives adapted to different deg and different varieties of irritation. Some irritative states are best comba permanently by tonics, as the mineral acids, &c.

SILVER furnishes us with a *nitrate* known as the lunar caustic, whose proper as an escharotic are detailed under that head. Internally, the nitrate of sil is a good anti-spasmodic in the chorea of dogs.

SODA is the *mineral* alkali, the medicinal properties of which do not differ terially from potash, or the vegetable alkali, which see. Its compounds y us common salt, called *muriate* or *chloride* of *sodium*.—See SALTS.

Chloride of Soda forms a better detergent, though it is inferior as a infector, to the *chloride of lime*. As an application for malignant and spre ing ulcers it possesses very great efficacy. It forms also a good stimulat injection for poll-evil and fistulous withers; and in grease it may be of advantageously employed. It seems likewise to hold out a promise of benefit in glanders, the virulence of which it has at least suspended; and when given in daily doses of from one to two ounces, in a properly diluted state, it has evinced a very powerful effect on the absorbents.

Spanish Flies.—See Cantharides.

Ergot of Rye, more commonly known as spurred rye, is an active ingredient of a principle not well understood, but very evanescent. It should therefore be kept in well stoppered bottles, and even then it must not be kept too long. Mr. Morton says it acts as an excitant in the throes of the uterus in doses of ʒij to ʒiv; but that it should not be given until the regular forcings of the womb have proved ineffective. It has been administered to the foaling mare with effect, but it appears to exert its powers most successfully in cows, sheep, and dogs. The *secale* is certainly an emmenagogue of great power, yet it should not be employed but when other means have failed.

Squills (*Scilla maritima*).—Squills are highly recommended by Mr. White; but I cannot speak in equal terms of their efficacy in the cases I have tried them. By their stimulating properties they may assist the bronchial secretions in a slight degree, and may therefore be added to tartarized antimony in the later stages of angina or catarrh; but in cases of emergency they ought not to supersede more active agents.

Starch.—In diarrhœa, starch clysters have proved very useful. It may also be given internally in such cases, united with chalk and opium.

Stimulants.—The veterinarian is doomed to hear the word *cordials* so often from mouths more fitted to receive them than to use them, on their horses at least, that he will gladly recognize all proper matters under this head in preference to the former much abused one. The *cordial ball* of the groom, and as well of the illiterate farrier, might be called *baleful*, got by *quackery* out of *ignorance;* and under the term cordial, I have pointed out when only it can be requisite in a state of health; and here will follow formulæ proper for those cases. *Stimulants* are medicines that exert an influence on the system by increasing the power and action of a part, or of the whole of it; hence they may be considered as very numerous, and the term as of very extensive signification. *Local stimuli* are all such matters as either promote the vascular, the nervous, or the absorbing energies; as friction, rubefacients, blisters, &c. *General stimuli* act on the sensorium at once, through the medium of the senses: the voice of the hounds stimulates the horse by his ears; the exertions of a fellow horse stimulate him to new energies through his eyes; and the stallion's fire is drawn forth by the scent of the horsing mare. *Absorbing stimulants* are heat, friction, depletion, mercury, &c.

Stomachic stimulants.—Such may be called *cordials*, as are intended to have a temporary effect on the stomach; and those may be noted as *stomachics* whose action is more permanent. Both the one and the other appear to act by a sympathetic effect they excite between the stomach and the system; but as this organ in the horse is not so sympathetic as that of some animals, so their activity here is less apparent: nevertheless, warm spicy matters do certainly possess some efficacy; but, as might be supposed, such cordials (i.e., stomachics) appear to act best, and most permanently, as are received into the system at large, as generous food, malt, gruel, ale, &c. After this, it may be gathered that much dependence is not to be placed on what are termed cordials. In compliance, however, with the general prejudice, I have added three formulæ, as good, perhaps, as any:—

No. 1.—	Gentian, powdered	eight ounces
	Ginger, ditto	four ounces
	Coriander seeds, in powder	eight ounces
	Caraway ditto, ditto	ditto
	Oil of anise seed	half an ounce.

Make into a mass with lard, honey, treacle, or conserve of roses, and give one ounce and a half for a dose.

No. 2.—Of the preceding mass	one ounce
Gum myrrh	one drachm
Balsam of Tolu	ditto.

No. 3.—Of the first mass	ten drachms
Camphor	one drachm
Opium	twenty grains.

Either of these may be given as a drink also, by infusing the powders in a of ale.

As *stimulants*, Mr. Vines, in his *Treatise on Glanders*, enumerates the lowing articles:—Cantharides, canella bark (*canellæ cortex*), capsicum ber (*capsici baccæ*), cubebs or Java pepper (*cubeba*), ginger root (*zingiberis rad* grains of paradise (*grana paradisi*), pellitory of Spain (*pyrethri radix*); all different sorts of peppers, as the common, black, cayenne, chili, long, white; pimento or allspice (*pimentæ baccæ*), sweet flag-root (*calami aro radix*), winter's bark (*winteræ cortex*).

More permanent stomachic stimulants are such as act not only by deter ing a greater quantity of blood to the stomach, which increases the ga secretion, but also by strengthening the muscular tone of that organ, w enables it to act with more energy in its digestive movements. The follo formulæ are inserted on these united intentions, and are therefore prope cases of convalescence, or recovery from debilitating diseases which have paired the appetite:—

Powdered canella alba	four drachms
Ginger	one drachm
Sulphate of copper (*blue vitriol*)	one drachm.

Make into a ball with conserve of roses.

Decoction of chamomile	three pints
Watery tincture of aloes	four ounces
Ginger, in powder	half an ounce
Sulphate of iron (*green vitriol*)	one ounce and a half.

Mix, and divide into four drinks.

Gum myrrh	two drachms
Mustard flour	one drachm
Cantharides	five grains
Chamomile powder	four drachms.

Make into a ball with thin Venice turpentine.

Powdered gentian	three drachms
Powdered quassia	three drachms
Powdered grains of paradise	three drachms.

Make into a ball with Venice turpentine.

Tonic stimulants are supposed to exert their influence on the muscular f and to improve their tone: this they do, in some instances, through medium of the stomach, and are then called stomachics (which see); or t are received into the blood, and then become a very part of the fibre th selves. *Tonics* are, therefore, stimulants of permanent action; and f which may be gained that this class is numerous, and is, in fact, diffu through the whole materia medica. A complete knowledge of their n bers and their effects can only be gained by an intimate conversance the animal economy, and the nature of the various foreign agents emplo in acting upon it. As a guide to the junior veterinarian and amateur, a formulæ, that I have found by experience to be efficient, are added; eit of which may be given daily:—

Gum myrrh	three drachms
Sulphate of iron (*green vitriol*)	two drachms
Chamomile powder	three drachms
Ginger, ditto	one drachm.

Mix into a ball with turpentine or palm oil; or into a drink with a pint of mild beer.

Arsenic	ten grains
Gentian, powdered	three drachms
Cascarilla, ditto	three drachms.

Mix into a ball with conserve of roses, or, as above, into a drink.

Gum myrrh	three drachms
Powdered gentian	three drachms
Levigated rust of iron	two drachms.

Make into a ball.

As tonics, Mr. Vines enumerates Angustura bark (*Cuspariæ cortex*), Buckbean (*Menyanthes trifoliata*), Cascarilla bark (*Cascarillæ cortex*), Chamomile flowers (*Anthemides flores*), Gentian root (*Gentianæ radix*), Quassia wood (*Quassiæ lignum*).

Stoppings are articles introduced into the hollow of the bottom of the hoof to moisten the horn; and in other instances also, as in cases of pricks, corns, or bruised soles. For the first purpose, any thing that will retain moisture may be used; the following will be found as good as any, as it not only moistens but toughens the horn:—

Cow-dung and horse-dung, mixed	six parts
Tar	one part.

Clay is not a good stopping. It dries too soon, and then rather adds to the evil of hardening the hoof than diminishing it: if clay is used, it must be mixed with something that will retain moisture, as one-third of its proportion should be cow-dung; and if a little tar be added, it will then make an adhesive and excellent stopping, sufficiently firm to yield pressure to the bottom of the foot without an injurious brick-hardness. In cases of pricks, &c., hot tar is not improperly used as a stopping. Pieces of tow are dipped into it, and are then retained by means of tough strips of wood, as withy from the broom-binding, which may be laid across. Oil of turpentine one part, horse turpentine one part, and grease a third part, make also a good warm drawing stopping for similar purposes; but it should be always first considered whether the case requires stimulating. Sole pads are now invented of thick felting, which, being passed within the shoe, and then wetted, swell, so as to be permanently retained, and at once yield pressure and moisture.

Storax.—See **Balsams.**

Styptics are remedies that restrain hæmorrhage, either internally or externally. Those used in the former case are acetate of lead, zinc, alum, and catechu; in the latter, vitriolated zinc and alum, together with such articles as coagulate the blood either mechanically or chemically, and thus plug up the open vessel.

Sublimate.—See **Mercury.**

Sudorifics.—These are uncertain remedies in the horse. We can procure a slight relaxation of skin by diluents, warmth, and diaphoretic medicines; but actual perspiration we can seldom excite, except by violent nauseants. Vinegar, however, in frequently repeated doses of six ounces, will generally produce it; but it appears to excite much action in the system, and hence not to be recommended. Increased clothing will generally produce it; but by exciting increased action, it may do more harm than good. In common cases, it will be therefore prudent to content ourselves with diluents, anti-

[illegible]moniale, and acetated liquor of ammonia [illegible]

SULPHUR. Flour of sulphur is a very [illegible] remedy [illegible] internally as an alterative, and externally as a [illegible]; for the latter purpose, the black sulphur which is cheaper, is equally proper.

SULPHURIC ACID, or Oil of Vitriol (*Acidum sulphuricum*), as it is commonly termed, is a preparation from sulphur which is seldom used [illegible] but as an escharotic, or added to blistering substances to increase their activity.

SULPHUR, BALSAM OF (*Oleum sulphuratum*).—Brimstone boiled in oil was used formerly to be called a balsam, and was then much used [illegible] in old coughs and thick wind; but, as may be supposed, with little advantage. Aniseated balsam of sulphur was made by adding oil of aniseed to the former.

SULPHATE OF COPPER (*Cupri sulphas*).—See COPPER.

SULPHURET OF QUICKSILVER (*Sulphuretum hydrargyri nigrum*), or Ethiops mineral.—See MERCURY.

SULPHATE OF MAGNESIA (*Magnesiæ sulphas*), Epsom Salts, or bitter purging salt, so well known, is a valuable medicine oftentimes to the veterinarian, much more so than the sulphate of soda, or Glauber's salt. In cases requiring a loose state of bowels, but where aloes are inadmissible, as in inflammatory affections, this salt is often a resource: in fevers it appears to have a double effect; one as a febrifuge, the other as an aperient. It requires from six or eight ounces to twelve, dissolved in water or gruel, to open the bowels, and sometimes it is necessary to repeat the dose before the effect is produced. It cannot, therefore, be considered altogether as a certain laxative; but when combined with linseed or castor oil, it seldom fails, particularly if assisted by bran mashes. In opening clysters, also, it may be very properly added.

SUPERTARTRATE OF POTASH (*Potassæ supertartras*), or Cream of Tartar.—See POTASH.

TAR is a very useful article to the veterinarian. Equal parts of tar and fish oil make an excellent application for the hoofs of horses, applied daily with a brush, the hoofs being previously moistened. Tar is also an excellent stopping for the bottom of the feet, in the proportion described under STOPPINGS: it is, also, either alone, or mixed with oil of turpentine and applied warm, often used with advantage as a stopping in pricks and bruises of the sole. Tar enters also into some of the digestive and detergent unguents, particularly in preparations for the cure of thrushes in the feet: it has also been given inwardly in balls; and from the water of tar as a drink in obstinate chronic coughs, joined with expectorants and alteratives, particularly of the mercurial kind, it is said much benefit has been received.

Tar, Barbadoes.—This was by old practitioners valued more highly as an internal remedy, and was often given for coughs; but, as far as my experience goes, it merits no preference: probably neither are very efficient, but may be used in making up the ball given on these occasions. Mr. Hart has been lately attempting to revive the use of it, under the name of Green Naphtha, as an internal remedy of great utility in all chronic chest affections.

TANNIN is prepared from oakgalls, and concentrates with it the gallic acid, by which it becomes a powerful astringent; and if its properties as an astringent would prove equal in all other animals as it does in the dog, we should not fear pure diarrhœa in any of them.

TARTARIZED ANTIMONY (*Antimonii tartarizatum*).—See ANTIMONY.

TENTS are substances introduced into a wound, to prevent its too early closing. In deep wounds having a narrow outlet, and when any foreign body remains to be expelled, they may be very properly employed; and any soft substance, as lint or tow, may be introduced for this purpose. But the old plan of the farriers, of cramming every wound with tents, is an absurd and hurtful practice.

Tin.—This is used as a vermifuge to horses frequently. It has, however, but moderate efficacy, and, when given, it should be always in fine filings, and not levigated, as there is reason to believe its action is purely mechanical; in which case, tin must be preferable to pewter filings, as being harder, but which are generally substituted. Dose, three ounces daily.

Tinctures, are solutions of vegetable or other matter in spirituous liquors. When any of the resinous gums are to be dissolved, pure spirit of wine should be used. When the roots, bark, leaves, &c. of plants are to be made into tinctures, dilute spirit is sufficient. Tinctures are not, in general, a convenient formula for the veterinarian. The substances employed are too diffused, and cannot be given in general cases in sufficient quantity, without using an unnecessary and even hurtful portion of the spirit or menstruum. But as sometimes it may be wished to give either aloes or opium diluted, so a watery solution or tincture might here be useful. In these cases, equal weights of the substance and of proof spirit may be digested together in a warm place for two days, and then the united articles may have double the weight of water added; and in this state the tincture may be kept for use. In giving it, the bottle must be shaken, and the sediment and all poured out. Any of the tinctures of the human pharmacopœia may occasionally be employed in veterinary practice, but, for the above reasons, this will never be a very useful formula. The principal ones in use are tincture of aloes; tincture of aloes with myrrh; tincture of benjamin compounded, called friars balsam; tincture of myrrh; and tincture of Spanish flies, all of which are occasionally used as detergents. Internally, also, all of them, except the tincture of aloes, are stomachics and tonics. Tincture of catechu likewise may sometimes be useful in restringent drinks. The tincture of opium also made as above, or a stronger laudanum, would be useful. Foxglove, as being a powerful remedy, may be very usefully given in tincture; and, for convenience, the veterinarian may keep this also of double strength to what is ordered in the Pharmacopœia.

Tobacco.—This is a very powerful narcotic. An instance is mentioned by Mr. White of two ounces having been given by an ignorant groom to produce a fine coat, which occasioned almost immediate death. But this very activity, when we are better acquainted with its mode of action, may be made subservient to important medicinal purposes. Tobacco is very useful in infusion, as an external remedy for mange.

Tonics are remedies so called from a supposed property of giving tone to the living fibre, by which they increase the action of the heart and arteries through the medium of the stomach principally, but through other media occasionally, as cold bath, exercise, friction, &c.—See **Stimulants.**

Turner's Cerate.—See **Cerates.**

Turpentine forms an article of very considerable importance in veterinary medicine. There is no great difference between the Venice and the common, which are the kinds principally used in our practice: both are considerable ingredients in digestive and blistering ointments; and either is also a convenient adhesive medium for forming balls. Internally, the Venice is a warm stomachic, an excellent assistant diuretic, and has some vermifuge powers.

Turpentine, Oil of.—This terebinthinated preparation is still more in use than the massy turpentine. Internally, in doses of two to four ounces, it forms an excellent antispasmodic in flatulent colic, and half the quantity in daily doses forms a valuable vermifuge; in both chronic and acute indigestion it is also serviceable. Externally, its use is still more frequent: it is a ready and never-failing stimulant, and hence it is the basis of the liquid blister; and more dilute, it forms the best application for old strains and bruises.

Unguents.—A derivative name for ointments; which see.

Verdigris (*Ærugo*).—See **Acetate** of **Copper.**

Verjuice is only an apple vinegar, and hence applicable to similar purposes with the common kind.

Vermifuges are such substances as remove worms from the body by mechanically irritating them by their spiculi, or such as dislodge them by removing the

mucus of the bowels, as purgatives, or such as prove noxious to the wor
themselves. Tin or pewter, or iron filed fine, but not levigated, two or th
ounces. Common salt, six to eight ounces; oil of turpentine, two to thr
ounces; savin, one to two ounces; cowhage, half a drachm: calomel, a scr
ple; arsenic, ten grains; aloes, till they purge: all these are thought to fal
one or other of these indications. Worm medicines should be given fasti
every day, for a fortnight.—See WORMS, in the DISEASES.

VESICATORIES, blistering articles.—See BLISTERS.

VITRIOL (*Sulphas zinci*).—White vitriol, or sulphate of zinc, is an excel
styptic and astringent: applied externally. Mr. Morton recommends it in a s
lution, as very useful in reducing the swellings of horses' legs, gorged by e
exertion. But instead of the common linen or woollen bandages usually e
ployed, Mr. M. recommends those made of chamois leather, which not o
retains its moisture, but also by its elasticity gives a continued compression
the relaxed or gorged limb. In ophthalmia it forms the best wash for t
middle and latter stages. It is also a good detergent in grease and other
conditioned sores.

Vitriolated Copper.—See BLUE VITRIOL.

Vitriolated Iron.—See GREEN VITRIOL.

Vitriol, Oil of.—See SULPHURIC ACID.

VINEGAR (*Acetum*).—The acetous acid is very frequently used in veterin
practice; it is of the utmost consequence, therefore, that it should be pu
It is, however, unfortunately, very liable to be adulterated with, or wh
made of, sulphuric acid, and then becomes very unfit for use as an inte
remedy, being changed into an active stimulant instead of a refrigerant. Vi
gar, not neutralized by salt or sugar, is capable of proving very noxious
the horse. We have instances on record of a pint of strong vinegar destr
ing life; but, neutralized with carbonate of ammonia, it forms a most excell
febrifuge, under the old name of Mindererus's Spirit. Neutralized with su
or honey, it forms a valuable expectorant called oxymel. As an external
plication, the acetous acid is likewise no less useful. In strains, bruises,
other local injuries, it is the base of the best remedies, either in combinat
with acetate of lead when active inflammation exists, or mixed with crude
ammoniac, or the bay salt, to counteract the effects of distention.—See SAL
EMBROCATION.

Vinegar, Distilled.—This elegant preparation is nothing more than the co
mon vinegar deprived of its water and feculent parts, but is in no respect p
ferable for the purposes of horse practice.

WASHES are watery solutions, or infusions, of various substances, to be was
over the parts to which they are to be applied.

WAX, WHITE AND YELLOW.—The yellow is principally used by the veterinari
to thicken and give consistence to ointments.

WILLOW BARK.—See BARK.

WORM MEDICINES.—See ANTHELMINTICS.

ZINC.—See VITRIOL and CALAMINE.

THE veterinary practitioner is recommended, at his outset in professional li
to furnish himself with a neat and appropriate *dispensary*. Nothing will lead mo
to a conviction in the minds of his employers, both that he is well informed
the curative properties of the various medicinal articles he uses, and that he h
possessed himself of the best that can be obtained, than a careful and methodic
arrangement of them within drawers, pots, or bottles, according to their natu
and qualities; all of which should be distinctly labelled with the names direct
by the London Pharmacopœia. The dispensary of the veterinarian should be
fac-simile of the apothecary's shop, except in the number of its articles bei
more limited; but it should be equally conveniently fitted up for the compoun
ing of medicines, with counter, mortar, slabs, &c. &c. It should also, like tha

be kept equally distinct from any other occupation; and not exhibit, as I have seen it, an assemblage of saddles, harness, and other stable paraphernalia; with the addition, perhaps, of receptacles for bran, oats, beans, &c. As the dispensary of the practitioner cannot escape public observation (indeed, it ought to be the *consulting* and *receiving* room in his professional engagements), so the appearances I have hinted at will inevitably injure his respectability, and sink him to the level of the smith or common farrier. Neither can it be favourable to the safety of the drugs themselves to be placed in any other than a warm, dry, and closed apartment. It is both the duty and the interest of the veterinarian to conduct every part of his practice with the same attention to system and professional appearance as are observed by the most respectable human practitioners; by which conduct he will assist to elevate the character of the art he practises to the rank it ought to hold among the liberal pursuits of mankind: and I need not add, that the elevation of that will insure his own.

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ADDENDA AND CORRIGENDA.

It was not until the Myology of this Volume had been introduced as it appeared in the last edition of the Veterinary Outlines that Mr. Spooner kindly proposed that I should, in this, make use of his improved myological nomenclature. It may be readily supposed how gladly I should have availed myself of his offer, in consideration of its superiority over that in use among the early teachers; but, most unfortunately, my own list had been printed some weeks before the generous proposal was made to me. Therefore it now only remains that I do earnestly request all the College students to study and dissect with Mr. Spooner's Myology before them, and to adhere to that only, until each is familiar with it.

SPLENT *versus* SPLINT.

It may also be observed that, through some inadvertence, the word *Splent*, as an exostosis, has sometimes been printed *Splint*, which we hope the reader will rectify.

Compton and Ritchie, Printers, Middle Street, Cloth Fair, London.

VALUABLE WORKS

ON

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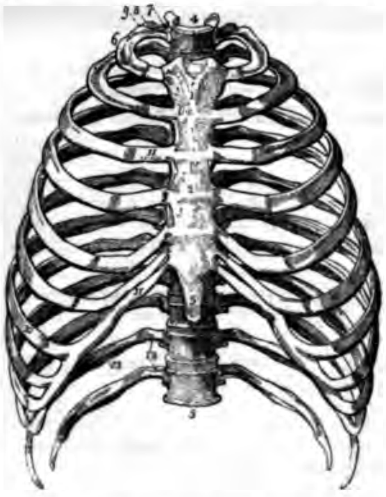

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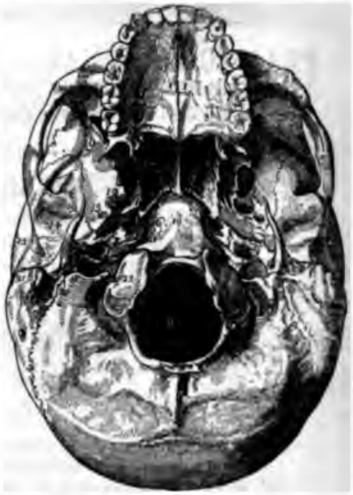

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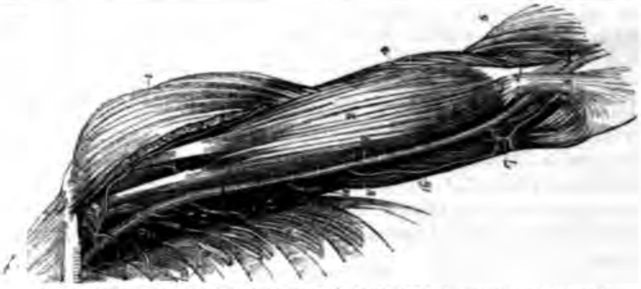

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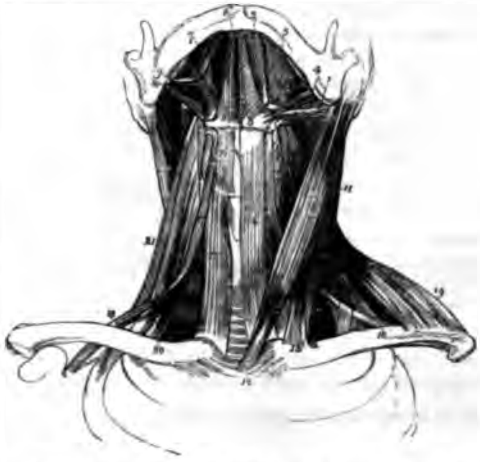

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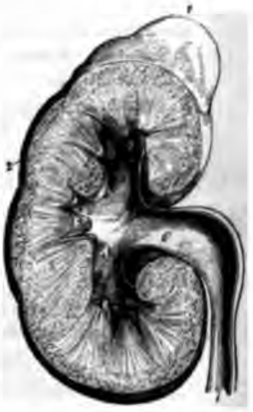

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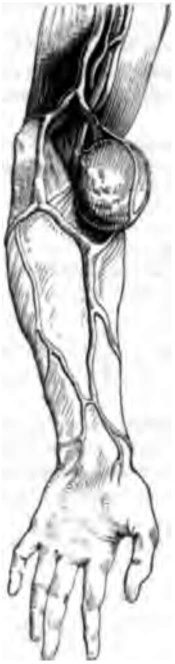

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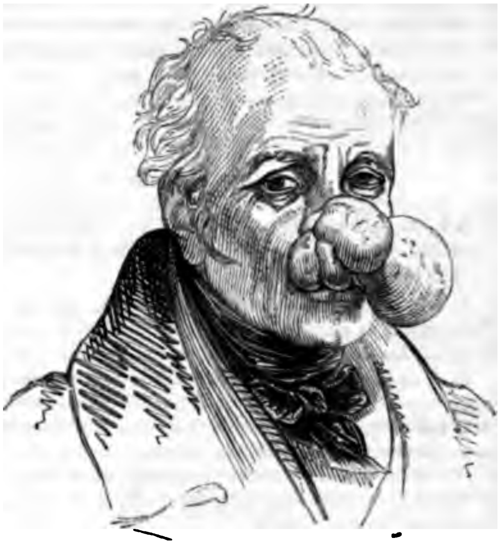

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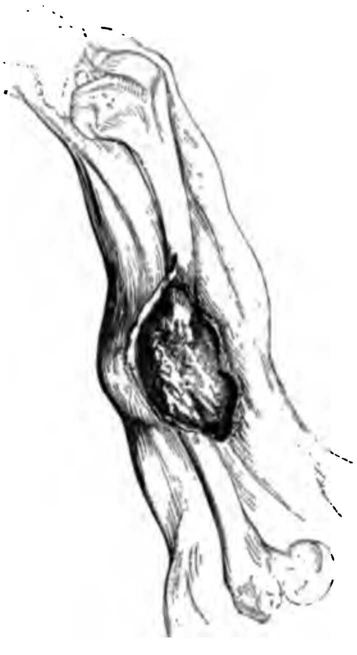

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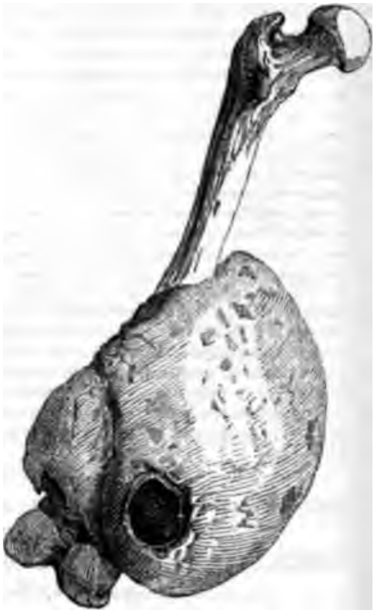

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